

Crossing Borders – Obstacles and incentives to researcher mobility



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Preface

This report consists of two studies, each providing extensive data on researcher mobility in the Nordic region and beyond. In each of the reports different aspects of researcher mobility is analyzed with the help of a wide range of data and varied methodological approaches. This makes the description rich in terms of perspectives on mobility and underlines the complexity of the issue. Together they provide a basis for understanding patterns and trends of researcher mobility across the Nordic region as well as different types of incentives and obstacles promoting and inhibiting such mobility.

Professor Krista Varantola, Chancellor of the University of Tampere has been assigned to reflect on the main findings of the reports and to comment on how NordForsk could in the future promote researcher mobility across the Nordic region. Her introductory reflections are based on her experience as member of the NordForsk Board during the period 2006 – 2012 and her long experience as leader of a research performing higher education institution and of science policy in general including researcher mobility.

NordForsk has commissioned Technopolis group, Faugert & Co Utvärdering AB to carry out the study “Mobility of researchers in the Nordic region: Sector mobility and international mobility of academic researchers”, and Nordic Institute for Studies in Innovation, Research and Education (NIFU) to carry out the study “Nordic Crossing”.

NordForsk wants to thank the following for their valuable contribution to this report, which hopefully will lead to an inspired debate on researcher mobility: Krista Varantola, Tobias Fridholm, Malin Jondell Assbring, Göran Melin, Eric Iversen, Trude Røsdal, Lisa Scordato, and Pål Børing.

NordForsk aims at facilitating cooperation in all fields of research and research-driven innovation when this adds value to national activities in the Nordic region. Priority is given to analysis as a basis for funding of research collaboration judged to have considerable potential for long-term societal progress. Researcher mobility is one of the key issues when accomplishing Nordic added value in research. My hope is therefore that this report will be discussed and used to enhance development of researcher mobility



Gunnel Gustafsson
Director of NordForsk

Reflections on two reports on researcher mobility commissioned by NordForsk

By Krista Varantola

Both studies aim to find out how researcher mobility has developed in recent years, what types of incentives exist for mobility and what types of obstacles prevent researchers from mobility.

The studies are also based on the assumption that mobility in the research world is a desirable phenomenon. This view is indeed shared by all actors in the field, from EU and other cross-national bodies to national governments and from research funding agencies to universities and research institutes. All of them aim to promote science and scholarship to create new knowledge or apply new knowledge by knowledge transfer through researcher mobility. It is also generally accepted that in order for knowledge-based societies to develop both in societal and economic terms they need to make most of the potential that researchers and research results offer in different disciplines. For this potential to materialize on equal terms, the global research community needs brain circulation rather than brain gain in some parts or regions of the world and brain drain in other regions. This in short is the ideological basis for mobility in the official contexts both at the EU-level and national levels.

The first study, **Nordic Crossing**, (hereafter NC) approaches mobility issues from the policy angle and offers a survey of existing mobility policies and programmes at EU-level, and shows how these have filtered down to national level policies and programmes. The NC study then aims to describe recent trends and rates of mobility among Nordic researchers as compared to the situation in the rest of the EU and European research area countries.

In addition, to gain a more detailed picture of Nordic mobility, this study also includes a detailed survey of information on mobility patterns from 1 900 CVs collected from Icelandic, Norwegian and Swedish sources. These CVs are not necessarily comparable and do thus not provide a representative sample.

The second study, **Mobility of researchers in the Nordic region**, (hereafter MR) on the other hand, is based on interviews of individual Nordic researchers who have been internationally mobile or mobile between academia and industry. The aim is to find out how researchers perceive mobility, what has motivated them to move around and what kind of obstacles have been most problematic to overcome. The interviewed researchers are at different stages in their career and represent all Nordic countries.

Reservations

A few reservations must be made before interpreting and applying the results for policy planning.

A major problem is the definition of mobility. In the NC study mobility is defined as a minimum three-month stay in a different environment. Mobility is divided into geographic and inter-sector mobility (“moving between different labour markets in different sectors – the academic, institute, and private sector”, p. 10). It remains unclear whether the inter-sector mobility necessarily involves moving to a different country. Another distinction applied in NC is the difference between career mobility (normally transition to a higher position, or a permanent position at another university) and task/function mobility between teaching, research or administrative positions. Again it remains unclear whether these types of mobility involve internationalization.

In the EU policy contexts, the aim of “researcher mobility is to make the researchers more mobile internationally and to provide a more attractive environment for researchers in Europe” (p. 12).

The survey of the CVs of Norwegian, Swedish and Icelandic researchers (collected from the internet in the case of Norway and from successful applications from funding agencies in Sweden and Iceland) leaves plenty of room for interpretation, because CVs in general are not standardized and their content tends to vary according to the purpose for which the particular CV is intended. Furthermore, it is obvious that three Nordic countries cannot represent the whole Nordic region.

Both studies study mobility from the point of view of researchers by discussing the share of mobile researchers in the Nordic countries in general as compared to the whole of the European research area or individual European countries. In other words, the information on inter-Nordic researcher mobility is scant. Furthermore, inbound mobility has not been included as a viewpoint. This means that no information is available as to the rates of “internationalization at home” in Nordic research institutions.

An additional problem is that inter-sectorial mobility is a very diffuse concept in both studies. It is included in the studies, but it remains unclear as to whether this type of mobility also means international mobility.

For the MR study, altogether 93 interviews were conducted, out of which 22 were with “mobility administrators” and 71 with Nordic researchers at different career stages. Out of these 22 concerned inter-sectorial mobility. All the interviewed researchers were researchers who had been mobile. No interviews were conducted with non-mobile researchers. In other words, the whole picture is diffuse and the results allow few generalizations.

For future NordForsk policy-making, presumably, the most interesting aspect about researcher mobility would be inter-Nordic mobility, in other words, the rates of internationally mobile Nordic researchers, whether they go into other Nordic countries or elsewhere and inbound mobility at Nordic research institutions (internationalization at home). In addition, aspects of inter-sectorial mobility would provide interesting information for Nordic research funding organizations as well as to Nordic innovation agencies. On the other hand, mobility from a temporary position to a permanent one or from a lower position to a higher position in a different location can hardly be considered as mobility that needs to be encouraged in policy terms. Furthermore, it would be important to know reasons for the “non-mobility” of researchers. No information is available on researchers who wanted to become mobile but could not achieve this aim.

In principle, all NordForsk initiatives are geared to promoting cooperation between different Nordic research communities in order to contribute to Nordic competitiveness in the global context. Inter-Nordic mobility is thus inbuilt into and encouraged in the existing programmes, projects and centres of excellence as well as in Nordic networks and summer schools.

Other possible criteria

A report published in 2012 by the ESF Member Organisation Forum on Evaluation on ***“Indicators of Internationalisation for Research Institutions: a new approach”*** (www.esf.org) is a very thorough pilot study on criteria that would probably have provided more appropriate criteria for studying international mobility. Funding agencies from three Nordic countries, Denmark (DFG), Finland (AKA) and Norway (RCN) were involved in the preparation of this document (p. 8). The forum identified three types of indicators - mature, developmental and blue sky - for both funding agencies and research performing organizations. Eight indicators relate to funding agencies and nine to research organizations. The full list of indicator matrices with feasibility and sources can be found on pages 13 and 15 of the report. The indicators for funding agencies include budget for attracting researchers from abroad (mature), international mobility (developmental) and openness of programmes (blue sky). Indicators for research-performing organizations, on the other hand include such indicators as budget coming from abroad (mature), international co-authored papers (mature), share of researchers recruited from abroad (mature), international mobility (developmental) and international use of infrastructure (blue sky). The executive summary of the report concludes with the following words:

This study shows that it is possible to assess the internationalisation of a funding agency or of a research performer through its different activities. It also suggests that future work would be valuable, aimed at producing common indicators of internationalisation of research institutions in Europe. Apart from the development required for the production of indicators, it would be useful to continue to debate the meaning of internationalisation and to further explore the way internationalisation of research and of research institutions is presently assessed in practice. (p.3)

The extent of Nordic researcher mobility

According to the NC study, among the EU27, the rate of Nordic mobile Nordic researchers seems to be somewhat lower than that of non-Nordic researcher population, i.e. 57% vs. 47% in the Nordic countries (p. 34). Another major difference is that Nordic researchers seem to be more mobile in social sciences and humanities (50%) and the non-Nordic researchers in science and technology (59%). It is difficult to say whether these differences are significant or not. We can, of course, speculate on the reasons. The Nordic countries have not suffered from the economic crisis as badly as southern or Eastern Europe where many researchers have lost their jobs. Social security in the Nordic countries has made Nordic researchers more confident even in insecure and temporary positions at home, the work environments are more researcher-friendly, etc.

What the overall statistics tell, however, is that about half of the researcher population (as defined in the studies) have not been mobile during their careers. In other words, there seems to be room for improvement in the Nordic researcher community. This assumption receives indirect support from the different policy measures at national Nordic levels which in various ways try to increase the rate of international mobility at national level. The main driver for these policies is naturally economic. The Nordic countries want to be competitive in the global context and try to ensure that the brain power, so essential in the knowledge societies, will continue to grow. We must, however, remember that in this thinking, Nordic countries also compete with each other. The focus of national initiatives differs from country to country. Some statistical information is also quite old, from 2006 and 2008, and does not necessarily reflect the current situation and the effects of the initiatives started over five years ago.

Incentives and obstacles to mobility

As stated above, the incentives at policy-making level whether European, Nordic or national, are based on the understanding that brain circulation and brain gain are essential for the development and success of our knowledge-based economies and societies. Historically this development has been succinctly described as contrasts from “haves vs have-nots” through “knows vs. know-nots” to “apply vs. apply-nots” societies. Currently this need for knowledge development and knowledge transfer is clearly highlighted in the mobility programmes which aim to promote mobility and remove perceived obstacles for the circulation of brain power.

National-level initiatives in the Nordic countries. All Nordic countries have aligned their mobility policies with the EU policies. In practice, these policies are then applied according to national interests and emphases (NC p. 21-31). The following quotes are highlights from the country-specific analyses in the NC study.

In Norway, the priority has been on priority is given to action line 3 (*Attractive employment and working conditions, including gender issues*) and action line 4 (*Enhancing the training and skills of European researchers, including inter-sectorial mobility*). Another example of the importance of EU policy developments in Norwegian research policy is the strategy for strengthening Norway’s cooperation in the ERA, presented by the Ministry of Education and Research in 2008. (pp. 21-22).

In Sweden, the emphasis has been on *the importance of researcher mobility for maintaining high quality and vitality within the research system. Recent government bills on research and innovation (Ministry of Education 2008 and Ministry of Education 2012) address the issue of mobility in relation to improving the conditions for young researchers in particular and for creating attractive research career opportunities and conditions. The government considers the latter to be a prerequisite to attracting and recruiting international researchers* p.25). In addition, *The Swedish Research Council (VR) has focused its attention on facilitating the transfer of research grants to other countries in case of relocation* (p. 25).

In Denmark, *according to an analysis by the Danish government, there is an ongoing, high demand for highly skilled researchers in the public and private sectors (Danish government, 2007). (p. 27). Furthermore, open, competition-based recruitment of researchers has been implemented at Danish higher education institutions and other public research organisations. At the programme level the Sapere Aude programme run by the Danish Council for Independent Research (DFF) promotes (indirectly) the mobility of researchers. The programme is designed as a talent development programme for the elite.*

Interestingly, there are no requirements regarding the applicants’ citizenship, the location of research institutions or the specific venue for carrying out the research activities applied for. However, in all cases, a general assessment criterion is the extent to which the project applied for will benefit Danish research. (pp. 27-28).

In the Finnish context, *strengthening the international dimension of the Finnish research and innovation system has been on the policy agenda for several years, evaluations continue to define Finland as “exceptionally inward-looking in these respects” (Ministry of Employment and the Economy and the Ministry of Education, 2009 page 38).*

According to available indicators such as the mobility of academics, Finland is among the least internationally oriented countries. The share of international teacher and researcher visits from and to Finland has decreased slightly in the 2000s, contrary to expectations and explicit policy goals (Ministry of Employment and the Economy and the Ministry of Education, 2010 and Research and Innovation Council of Fin-

land, 2009). Attracting more international researchers is thus a particular challenge for Finland compared to the other Nordic countries. This applies not only to academics, but also to foreign innovation experts (Ministry of Finance, 2008). (p. 28)

Moreover, as part of the reform process, the Ministry of Education has drafted an internationalisation strategy for higher education which aims to strengthen the international attractiveness of Finnish universities. The main objectives of the strategy are to increase the capacity of higher education institutions to offer high-standard education in foreign languages and increase the share of foreign teachers, researchers and degree students (Ministry of Education, 2009). (p.28).

At the programme level, FiDiPro (Finland Distinguished Professor Programme) is a joint funding programme under the Academy of Finland and Tekes to recruit scientists from abroad, offering fixed-term research and teaching posts to top foreign scientists or to Finnish scientists who have worked for a long time abroad at the professorial level. (p 29).

In Iceland, like in the other four Nordic countries, internationalisation of research is a key policy objective for Icelandic policymakers. In the wake of the financial crisis that severely affected the country in autumn 2008, policymakers have had to deal with concerns about a large outflow of qualified human resources. (p.29).

Traditionally, there has been a lack of specific policies for attracting foreign researchers (Taxell et al. 2009), and financial resources for researcher mobility have been scarce. A further problem has been the limited use of international programmes, such as the Marie Curie mobility programme managed by the European Commission on behalf of institutes and private companies (STPC 2010-2012). (p.29)

The portability of grants, i.e. “money follows the researcher”- principle initiated by EUROHORCS is a nice idea in theory that is not yet applied in practice. There are obviously various reasons for this. One of them is that many grants are based on the principle of matching funds between the funding organization and the research institution. It is little wonder then that research institutions are unwilling to lose the grant money if, for example, they have invested in the salaries or the infrastructure of the project to be moved.

The role of sabbaticals is also worth pointing out in this context. Their significance for international mobility is extensively commented upon in the MR report (Cf. e.g. 5.2.2 Sabbaticals, pp. 38-39.) The report summarizes: *Most notably, university-funded sabbaticals – an admirable form of support – more or less only exist in Iceland and Norway.* (p. 46-47).*

It is necessary to keep in mind that the above extracts come from reports some of which were published over five years ago. They also reflect different rhetorical aims and traditions. It is thus difficult to say whether the points made in them are still valid or whether the incentives applied have had positive effects. For example in Finland, the new formula used for the funding of universities from the state budget includes very strong incentives for universities to focus on internationalization both in terms of publications and exchange activities.

Probably, the main lesson to be learned is that there are “important country differences that affect mobility in various ways” (NC p. 60).

* From the Finnish point of view, it is worth noting that over the years there have been various attempts at sabbatical systems that have mainly been available for professor-level candidates. Previously the Academy of Finland had an instrument, the so-called senior scientist programme, which was discontinued a few years ago, when the responsibility for organizing sabbatical leaves was left to the universities.

Currently, it is possible for permanently employed professors to apply for a sabbatical grant from a programme that is jointly funded by private foundations and the universities. It is a time-limited programme which is meant to end after five rounds in 2015. What is and has been common to all of these instruments is that they are all competitive in nature. Admittedly, however, it has been much easier for eligible candidates to get personal funding from these programmes than e.g. from other highly competitive instruments such as post-doc or project-funding programmes.

The NC study (pp. 60-61) points out that “mobility is (re)emerging as a central priority of European research and innovation policy”. It also points out the eagerness of the Nordic countries to support this policy. However, information on inter-Nordic mobility is not available and the conclusions of the studies are not very coherent. Problems also arise because the mobility categories referred to do not seem to be clear-cut and conceptually identical. For NordForsk, the crucial issue would presumably be to find answer for the questions: What can NordForsk do at policy-level to promote the common interests of the Nordic countries? How could inter-Nordic mobility strengthen the position of the Nordic countries in the European or global research and innovation context?

Incentives and obstacles for individual researchers

The most important incentives for individual researcher mobility are related to career development. In short, it is hardly possible today to advance from a non-permanent post doc position to a permanent professorial position at a university without a stay abroad. This is particularly true in medicine and biosciences but increasingly so in all disciplines. Furthermore, a stay at an international centre is a great stimulus for a researcher. It is a way to establish future networks and to start an independent phase in the research career.

One reason for this need for independence could be the following. It has recently often been pointed out how these days the “academic childhood” lasts much longer than before. In the past decades, the researcher was considered mature after the doctoral dissertation. It was also common practice that aspiring researchers prepared their grant applications themselves individually without much support from their seniors. It is no longer so. Today, it is in many cases the senior researchers who are supposed to take the initiative, draft the project proposal and define the roles of the junior researchers in the research team.

The obstacles, on the other hand, are usually related to individual and family reasons. The grant may be too small to support the whole family’s stay abroad, existing social benefits may disappear, the partner may not be able to find work, the children’s day care or school arrangements cause problems, etc. In other words, organizing a research visit abroad for one member of the family is a balancing act, even more so for women who often carry the heaviest burden for the care of the children.

Other hindrances are often based on the institutional attitudes towards mobility. Researchers feel insecure about their future job opportunities and the recognition of their achievements during mobility after returning home from the research visit. The university management may be pro mobility but at department level the situation may be different, often because of the inconvenient practicalities for curriculum planning.

Other types of problems arise in the mobility between research institutions and the private sector. Researchers are usually faced with either-or situations. It is not easy, for example, to return back to the university after a period in industry or vice versa. Cooperative practices are encouraged but they are not without problems and not so common either.**

The MR study does not touch upon problems related to the unavailability of mobility grants, because no non-mobile researchers were interviewed. It would, however, be of interest to know if the lack of mobility grants, especially within the Nordic countries is seen as a hinder to mobility.

** The MR study discusses the role of adjunct professors in different Nordic countries. However, adjunct professor means different things in different countries. In Finland, it is an incorrect translation of Docent. Many Finnish docents still prefer this translation, but it is not acceptable for example in the applications to the Academy of Finland.

“The Finnish Advisory Board on Research Integrity (TENK), Universities Finland UNIFI and the Rectors’ Conference of Finnish Universities of Applied Sciences Arene ry and the Academy of Finland have together drafted a model curriculum vitae that complies with good scientific practice”. (cf. www.tenk.fi, template for researchers’ curriculum vitae). In this document it is stated that the acceptable translation of dosentti is Docent.

Furthermore, Docent in Finland is nowadays a title which does not imply any formal work relation with the granting university. The primary reason for applying for the title of docent is usually for the applicants to prove that they have reached a certain level of competence in their post doc phase. This competence level is in principle required from post doc applicants who are seeking grants to establish their own research teams or applicants to certain university hospital positions. This level is, however, not as high as that required from professors. (cf. the passage on p. 21 in the MR study which claims that “Adjunct professorships are strategic because they imply that the researchers’ competences are evaluated to ensure that they have professorial competence”.)

What could NordForsk do?

Also the MR study points out the heterogeneity and differing national agendas among the Nordic countries. In addition, it discusses some successful national-level programmes, as well as the benefits of sabbaticals in general (pp. 46-). Another general conclusion is that more flexibility is needed in mobility instruments for them to fit the researchers' needs at different career stages: ...“researchers need support programmes with wide ‘entrance gates’ and considerable room for moving and manoeuvring once inside, according to the preconditions and needs of each individual.” (p.48).

The two studies contain no information on incoming mobility; neither do they contain information on reasons for non-mobility of Nordic researchers. Does it depend on individual choices or lack of funding instruments in general or for certain disciplines in particular? This type of information would certainly be useful for Nordic policy planning.

Mobility is strongly advocated in all the Nordic countries and the national policies follow closely EU-level policies. A joint aim at national levels is to obtain a larger share of the funds available through the various EU funding instruments.

It is worth noting that mobility in general and inter-university mobility in particular are nowadays an essential part of major funding programmes, cf. e.g. the terms of some major grant programmes of the *Wallenberg* and the *Riksbankens jubileumsfond* foundations in Sweden.

It could thus be claimed that NordForsk's role as a catalyst for Nordic cooperation is to prove that by joining Nordic forces it is possible to improve Nordic chances in the highly competitive European context and also strengthen the role of Nordic research hubs in the international context. Inter-Nordic mobility and inbound mobility would help in the strengthening of such hubs.

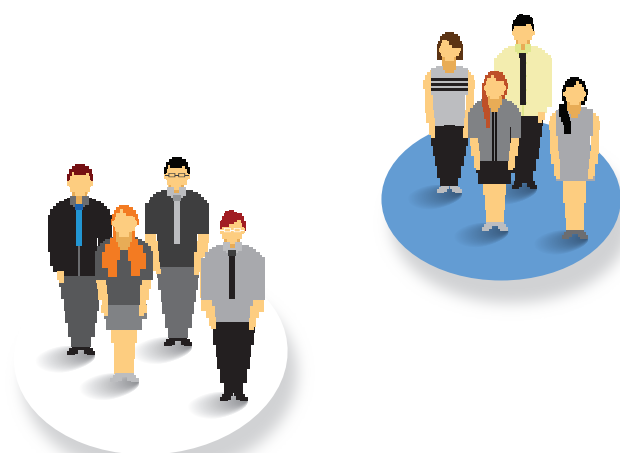
The added Nordic value is the prime driver of all NordForsk activities. One possible way to further promote mobility in the current and future programmes is to integrate an optional funding instrument into these programmes. This instrument could promote researcher mobility as a capacity-building instrument and it could be used by the centres of excellence or projects to attract visiting researchers or sending out researchers to other Nordic countries or elsewhere. It could also be used to support emerging centres to establish themselves in the international research community.

It is also clear that the mobility grants should be fit for purpose based on lump-sum funding without too many restrictions as to time or type of mobility. The sole criterion could be the justification for the visit and its impact on continued cooperation. Junior researchers have different needs from senior researchers both in individual, family-related terms and in career- and competence related terms. Travelling from one country to another is no longer an obstacle. It is quick and actual travelling costs are relatively speaking much smaller than they used to be. Keeping in touch between the visits is not a problem either. Various types of cooperation are possible virtually and in real time as long as they are reinforced from time to time by face-to-face cooperation.

Another aspect is third-country cooperation and research projects with non-Nordic partners. Such programmes are in existence and could be complemented with mobility grants. This could also happen at the start-up stage. For example, the Nordic Council of Ministers supports network-building between Nordic and Chinese universities through a funding programme managed by the Nordic Centre (a cooperation platform for 27 Nordic universities and Fudan University and other Chinese universities). Such grants could also include mobility grants for emerging research cooperation.

Inter-sectorial mobility is a different type of mobility that needs first of all to be defined more clearly. Is it a priority in a Nordic context if it does not also include international mobility? Secondly, it can be asked whether inter-sectorial mobility is a NordForsk priority or is it something that should in the first place be driven by Nordic innovation agencies.

Overall, there is no doubt that international mobility is everywhere seen as the prime driver of economic and societal development. It is another thing whether current mobility instruments and their rules and definitions of mobility are up-to-date in the current research environment. The travel costs play a smaller role than before and the ways of using digital communication and accessing digital publications and data are increasingly versatile. Maybe we should start looking at mobility from this angle and consider it as an integral part of continued international research cooperation, a part that can take place in instalments at suitable periods of time.



Crossing Borders – Obstacles and incentives to researcher mobility

Study 1: Mobility of researchers in the Nordic region: Inter-sectorial mobility and international mobility of academic researchers

Faugert & Co Utvärdering AB



Summary

This report presents the results from a broad study of Nordic researchers' experiences of mobility. The study concerns two types of mobility: two-way mobility between academia and industry, and outgoing international mobility of academic researchers. The aim is to provide a deeper understanding of research mobility in the Nordic region. The study seeks to identify drivers of and obstacles to research mobility, as well as good Nordic practices related to research mobility.

The study is based on 93 interviews with two categories of respondents. In the first stage we interviewed 22 administrative officers at a selection of mobility funding organisations in the five Nordic countries. In the second stage we interviewed 71 researchers in these countries from various disciplinary backgrounds, of different ages and in different career phases. Around one-third of the interviews were conducted with representatives from industry on the topic of inter-sectorial mobility.

Results

Our findings show that personal capacity building through meeting new, competent people is a common driver of research mobility. This is especially mentioned by university researchers who go on temporary trips abroad and by adjunct professors at universities. Researchers are also able to work better together if they spend time together, since efficiency in research collaborations is often based on shared understandings of what will be done.

Mobility for knowledge creation also concerns opportunities for empirical research, typically by access to research infrastructure or proximity to specific phenomena of study. This is a key factor behind mobility to institutions that have one-of-a-kind facilities, but it is more common that the attractiveness of research infrastructure lies in the entire setup of the environment, including context-specific data and skilled technical staff.

A significant number of respondents mention a desire for independence as a main motive for mobility. The point has most frequently been made by university researchers on temporary stays abroad, who argue that they become more productive while being away. It has also been strongly underlined by some early-career researchers who saw the need to build career platforms in relative independence from senior colleagues; international post-docs could be particularly useful in that respect. The attractiveness of specific research environments also lies in conditions such as organisational strategies, leadership, work atmosphere, and the potential to establish networks with researchers and organisations outside the home environment.

When it comes to mobility and researchers' careers, unstable positions in the previous organisation was the most important reason behind mobility to permanent positions. Researchers in industry have often left academia because they could not find a permanent academic position. Those respondents who share their time between a university and a company say they can improve their scientific track record and competence by working with researchers with complementary competencies and by accessing good infrastructure or data.

The career-strategic reasons that academic researchers go abroad concern the development of strategic networks and the building of a strong CV. Strategic networks facilitate the attraction of funding, publications in high-quality journals, and the opportunity to attract good PhD students and post-docs. International mobility generally seems beneficial for academic careers by paving the way for publications, project partners and funding. However, international mobility only marginally generates merit in itself.

Inter-sectorial mobility has proved to be career-strategic for researchers now working in industry where PhDs are often quite rare. Most of the adjunct professors interviewed, however, find that it can be difficult to convince company managers of the value of using staff mobility to form bridges to universities. In addition, having positions in both universities and companies can be negative for work efficiency, which tends to affect the scientific work more than the company tasks.

Mobility has often had a large impact on researchers' private lives. Many researchers become mobile to gain enriching experiences for themselves and, in the case of international mobility, sometimes also for their families. However, family is often cited as a financial or practical obstacle to international mobility, not least since the period in life when people have children often coincides with the period when research careers take off. Despite the various obstacles, there is nevertheless a general consensus amongst the respondents (who had all been mobile) that challenges are part of the experience and that most researchers are willing to deal with them.

Many respondents emphasise access to social security as a crucial factor when going abroad. If the researcher is employed by their home organisation while being away, issues are easily solved. The same is true for mobility within the EU. However, living abroad has created administrative burdens for some respondents, such as fiscal regulations and obtaining a visa. Administrative burdens are often related to bringing family members, even when moving within the EU.

When it comes to financial support for temporary international mobility, four types of funding dominate: support from the home institution, external funding from a research project, external funding from a programme specifically focused on research mobility and funding from the host institution. For those researchers who had their stay financed by the host or home organisation, funding has generally met the researcher's needs. Those who relied on grants and scholarships, however, occasionally encountered problems, usually related to the uncertainty of funding which can make extensive trips difficult to plan and arrange.

Respondents remark that support from the local university research environments is important for international mobility, but that the interests of university managements and department managements differ significantly. The department level can be a bottleneck and researchers observe that it can be difficult to get out of teaching duties. There are, however, two outstanding Nordic examples of university support to mobility: university-funded sabbatical semesters for Icelandic and Norwegian researchers.

Reflections

Above all, this study shows the importance of putting research mobility in a context. We have shown that individual researchers often have very different motivations for engaging in mobility, depending on career stage, family situation, employment position, and research interests. We have also highlighted how the interests and strategies of companies, universities and research funders shape the opportunities that researchers have, and thus also the choices they make. Finally, throughout the study we have shown that research mobility is a means to reach other ends – the researchers' visions for his or her career, a boost to the creative potential in Nordic research environments, or efficient knowledge exchange between universities and companies.

Points of consideration for NordForsk and other Nordic stakeholders in research mobility include:

- There is a need for flexibility in mobility programmes; one-size-fits-all generally does not seem appropriate. Flexibility is easier to handle if the funder has carefully considered which larger goals the programme should address.
- The heterogeneity and various examples of good practice across the Nordic countries indicate a potential for fruitful exchange and coordination.
- Public co-funding of 50 per cent or so would significantly reduce the barriers that prevent temporary mobility between companies and universities from taking place.
- There seems to be high demand among university researchers for support for two to six months of international mobility. Such support should also include funding to bring families along.

1. Introduction

This report presents the findings from a comprehensive study of Nordic researchers' experiences of being mobile. The aim of the study is to provide a deeper understanding of research mobility in the Nordic region. The study seeks to identify drivers of and obstacles to research mobility, as well as good Nordic practices related to research mobility.

The issue of researcher mobility is not new. It has long received significant attention, and many studies and investigations precede this one. Still the issue of mobility continues to be high on the agenda in various policy contexts. Policymakers, funding organisations and researchers are asking for more knowledge. New policy actions are required in order to create research and innovation systems that are more efficient and give better return to society than today, regardless of whether we are speaking of national contexts or focus on, for instance, the European level. Mobility of researchers is one characteristic of prospering research and innovation systems.

We based this study on previous studies and established knowledge. Shortly below, we mention a few recent mobility projects that in particular have served as a starting point. Our intention has been to contribute to existing knowledge with further understanding of how researchers from the Nordic countries perceive mobility. The study covers both Nordic academic researchers who have been internationally mobile, as well as Nordic researchers who have moved between academia and industry, referred to as "inter-sectorial mobility". Furthermore, the study covers researchers of different ages and in different career phases. The factors that influence mobility carry different weight depending on where in the research career the individual is. To our understanding, it is also quite a different experience to move to another country if one is young and single compared with if one is in the midst of family life.

We have taken a qualitative approach. We believe that our purpose - to investigate the factors that influence researcher mobility at the individual level - is best achieved through interviews. Researchers in all five Nordic countries are included, together with a set of administrative staff at organisations that fund mobility. Nearly one hundred interviews have been conducted.

This report is one of two reports from the same project that the Nordic research funding organisation NordForsk has commissioned. This report focuses on the motives of and barriers experienced by individual researchers. The other report is published by the Nordic Institute for Studies in Innovation, Research and Education (NIFU) in Norway and mainly concerns patterns and trends of mobility, with a Nordic focus. The NIFU report also offers an extensive review of policies and policy initiatives for research mobility in both the European Union and in the five Nordic countries.

This study has been carried out between November 2012 and September 2013 and has been undertaken by three sub-teams:

- Interviews in Denmark have been organised and conducted by Evanthia K. Schmidt and Ebbe Krogh Graversen at Danish Centre for Studies in Research and Research Policy, Aarhus University, Denmark.
- Interviews in Finland have been organised and conducted by Katrin Männik and Katre Eljas-Taal at Technopolis Estonia.
- At Technopolis Sweden, Göran Melin (project manager), Tobias Fridholm, and Malin Jondell Assbring have conducted interviews in Sweden, Norway and Iceland. Peter Stern has contributed with proofreading and quality assurance. The Swedish team has also been responsible for the outline of the study, overall project management, and authoring of the report.

The authors and our participating colleagues in Denmark and Estonia wish to thank all respondents who kindly shared their thoughts and experiences during the often lengthy interviews. Support and information have also been given by other individuals, for which we are most grateful. Finally, we wish to thank our colleagues at NIFU for an informal and generous exchange of information and assistance throughout the course of the study.

1.1 Aim of study

The aim of this study is to provide a deeper understanding of research mobility in the Nordic region. The study seeks to identify drivers of and obstacles to research mobility. The study also seeks to identify good Nordic practices related to research mobility. Research mobility refers to:

1. two way mobility between academia and industry, and
2. outgoing international mobility of academic researchers.

1.2 Methods, material and definitions

Our empirical material consists of 93 interviews with two categories of respondents. In the first stage we interviewed administrative staff at a selection of mobility funding organisations in the five Nordic countries, in total 22, to get an overall picture of researcher mobility and to identify aspects and issues that are important to (potentially) mobile individual researchers. In the second stage we interviewed 71 researchers in these countries. The researchers come from various disciplinary backgrounds, and are of different ages and in different career phases. Of course both men and women are represented. Some of the researchers come from industry, although the majority come from academia.

1.2.1 Definition of “mobile researcher”

In the case of international mobility of academic researchers, we have defined mobility as an event in which a researcher has permanently or temporarily left an academic institution in a Nordic country to work full-time as a researcher for at least three consecutive months at an academic institution in another country in the Nordic region or elsewhere.¹ Thus, we have only included outgoing mobility. Incoming mobility, for instance when a researcher is recruited from Germany to work at a Danish university, is not included. We chose the mobility threshold of three months because it is the standard threshold used by European policy agencies including NordForsk. It is also a useful threshold because it implies that the researcher has the chance to integrate relatively deeply into the new research environment and typically also that practical arrangements – both professional and private – tend to become more complex.

Our definition of international mobility of academic researchers has meant the inclusion of several kinds of such mobility:

- Mobility to a permanent research position;
- Mobility to a research position that is limited in time, such as a post-doc;
- Temporary mobility as a visiting researcher, etc.

Research mobility between academia and industry (inter-sectorial mobility) is defined as an event in which a researcher has permanently or temporarily either left an academic institution in a Nordic country to work the equivalent of full-time for at least three consecutive months in a company, or left a company to work the equivalent of full-time for at least three consecutive months at an academic institution in a Nordic country. In a majority of the cases where researchers have left a company to work in academia the mobility has not been full-time. In these cases we have re-calculated the three-month threshold such that, for example, a researcher who is employed in a 20 per cent position at a university must have (recently had) a contract of at least 15 consecutive months (3 months divided by 0.20) to be included. The definition implies the inclusion of several sorts of sector mobility:

¹ This definition is similar to the definition used in the MORE study, in which “a geographical-mobility event is one where the researcher has obtained his highest degree in country X, and subsequently has worked as a researcher for a minimum of three months in country Y (where X is different from Y)” (IDEA Consult 2010).

- Mobility from a university to a permanent research position at an established company;
- Mobility from a university to (one's own) start-up company;
- Mobility from industry to a permanent research position at a university;
- Temporary mobility from industry to a university, typically a part-time position of 20-50 per cent;
- Temporary mobility from a university to industry.

To ensure the accuracy of the study we only interviewed researchers who had been mobile during the last five years, between 2008 and 2013. Some of the researchers interviewed had also been mobile before 2008; in those cases our interest was in their mobility in 2008–2013, but of course we explored the extent to which their recent mobility was linked to their mobility prior to 2008.

1.2.2 Methodological considerations

We chose to interview researchers because it enables us to capture and follow-up details and in that way put the researchers' mobility experiences in context. Interviews make it possible to attain empirical material that in effect consists of a large number of 'micro-case studies' – each interview is in practice a case-study of that single researcher's mobility experience. This gives us empirical material that treats each individual 'as a whole', with different aspects of mobility naturally linked with each other. For instance, had we instead conducted a survey, we would have found it difficult to treat statements on issues such as choice of location, employment condition and family situation in relation to one another, even if these aspects for the individual researchers are intimately linked.

Another important benefit of our interview study is that it offers a dual possibility of handling data. On the one hand it enables us to identify and discuss patterns, and on the other hand we can illuminate diversity. In other words, the empirical material enables us both to draw conclusions about the general and to point out that which is out of the ordinary but yet may be of great importance to some individuals and possibly also worth considering in the development of policies and programmes for research mobility.

Thus, we have a sample of individuals who have been mobile. It would also have been most interesting to interview researchers who had considered being mobile, but who chose not to. Unfortunately, the limitations of the study have not allowed us to do that. As a consequence, our sample may be less suitable with regard to identification of barriers to mobility. However, as the quotations in the report show, the mobile respondents have still been able to comment and reflect extensively on those factors.

1.2.3 Conducting the study

The empirical study was carried out in two main steps:

1. Interviews with 22 officers at 'mobility organisations' in the five Nordic countries to get an overall picture of researcher mobility and to identify aspects and issues that are important to (potentially) mobile individual researchers. Almost all these interviews were carried out face-to-face and typically lasted 45–60 minutes. Many respondents also provided us with material on research mobility such as programme documents or analyses.
3. Interviews with 71 researchers in the five countries. The researchers have various disciplinary backgrounds, are of different ages and in different career phases. We also tried to keep an even balance between women and men. Some of the researchers work in industry, but the majority are employed in academia. A total of 49 interviews concerned international mobility and 22 concerned inter-sectorial mobility. These interviews were typically carried out by telephone and lasted around 45 minutes. The sample of researchers is presented in Table 1 and Table 2.

We selected the respondents at 'mobility organisations' by locating the main funders of research mobility in each country and contacting their officers responsible for relevant mobility programmes. These officers either invited us for interviews or helped us to reach the right persons, in some cases by redirect-

ing us to their colleagues, in some cases by giving us names of university administrators working with mobility. We conducted 22 interviews with such officers – five each in Denmark, Finland and Norway, three in Iceland, and four in Sweden. A majority, 14, of the interviews were conducted with governmental research funders,² five with universities, and three with private research foundations.

We located the research respondents in several ways, mostly through available lists of funded researchers in mobility programmes, investigation of CVs that researchers had published on their personal university websites, and in Norway also through the public database CRISStin.

Table 1: Sample details, International mobility

Country	Sex		Career stage			Scientific discipline				Country total
	F	M	Post doc	Mid-career	Professor	Social sciences and humanities	Medicine	Natural sciences	Engineering	
Denmark	6	5	4	3	4	4	2	5	0	11
Finland	8	4	4	4	4	2	3	3	4	12
Iceland	3	4	1	4	2	7	0	0	0	7
Norway	4	5	2	3	4	2	3	2	2	9
Sweden	5	5	4	4	2	3	1	2	4	10
Total	26	23	15	18	16	18	9	12	10	49

Table 2: Sample details, Inter-sectorial mobility

Country	Sex		Industry sector					Country total
	Female	Male	Manufacturing	Pharmaceuticals	ICT	Energy	Financial and legal services	
Denmark	2	3	0	2	3	0	0	5
Finland	0	3	1	0	2	0	0	3
Iceland	0	1	0	1	0	0	0	1
Norway	0	4	0	0	0	2	2	4
Sweden	6	3	3	4	1	1	0	9
Total	8	14	4	7	6	3	2	22

In Table 1, post-doc refers to researchers who had a post-doc position or the equivalent (time-limited employment shortly after PhD graduation); professor refers to researchers employed as professors, and mid-career refers to researchers in career stages between post-doc and professor, for example as lecturers, associate professors or as permanently or temporarily employed researchers beyond the post-doc stage. The definitions of scientific disciplines are based on the standard categories in the Frascati manual. Thus, medicine includes medical and health sciences, and engineering includes engineering and technology. No researchers within agricultural sciences were interviewed. In Table 2, we have tried as far as possible to classify firms into industry sectors that correspond to classes in the NACE standard, used in the European Union.

2 Including Sweden’s public research foundations.

It should be emphasised that the sample of researchers is not a randomised selection, and that although the number of interviews may be regarded as rather large it is still too low to have any kind of statistical significance. We have made an effort to include individuals with different backgrounds to create a set of respondents that is reasonably varied and representative for the mobile scientific community. However, in some countries we had great difficulties in locating willing respondents in specific categories. Most notably, in Finland we had problems locating inter-sectorial mobile researchers, in Iceland we found it difficult to locate mobile academic researchers in medicine, science and engineering as well as inter-sectorial mobile researchers, and in Norway we struggled to find respondents with inter-sectorial mobility experience. As a consequence, we ended up interviewing fewer researchers with inter-sectorial mobility experience than we intended to, and the social sciences and humanities are slightly overrepresented. However, we still believe the absolute numbers of interviews of inter-sectorial mobile researchers and of researchers in medicine, natural sciences and engineering are large enough for the purposes of this study.

1.3 The MORE and Rindicate studies

This study is certainly not the first study on research mobility. As a prioritised area in research policy, a wide range of studies have been conducted on mobility, usually from a quantitative perspective, aiming to understand mobility patterns and to identify important drivers and barriers. Our colleagues at NIFU have conducted a comprehensive review of previous studies, to which we refer interested readers. NIFU has also undertaken an extensive mapping of policy initiatives for research mobility in the European Union as well as in the five Nordic countries. That review is of great interest for this study as well.

Two previous studies have been particularly important for us as points of departure: The MORE and Rindicate studies, both initiated by the European Commission. The two studies are briefly summarised below. When we had completed the empirical work for this study the MORE2 report was published. We also briefly review that report below, although we were not able to draw on it for this study.

1.3.1 The MORE and MORE 2 studies

In 2008 the European Commission launched a study of mobility patterns and career paths of EU researchers, known as the MORE project (Mobility Patterns and Career Paths of EU Researchers). During the project, the IISER (Integrated Information System of European Researchers) indicators database was further developed and updated and three EU-wide and one extra-EU survey were conducted to collect information on researchers' characteristics, employment situation, mobility and the factors influencing and motivating mobility, as well as the perceived effects of mobility. Surveys targeted four sub-groups of researchers divided by sector of employment and geographical location.

According to the survey, more than half of the researchers (56 per cent) had been internationally active, meaning that they had moved from the country of their highest graduation to work as a researcher for at least three months in another country. At the same time 17 per cent of the researchers had moved between the private and public sectors.

In the study, researchers were asked to identify the most important factors that influenced geographical mobility and which of these they considered to be barriers to mobility. Practical influencing factors (administrative and non-career/profession-related factors such as the social security system, administrative barriers, language issues, childcare, etc.) did not seem to play an important role in the mobility decision of academic researchers. Female researchers and non-mobile researchers placed greater importance on child-care arrangements, and EU-US mobile researchers assigned less importance to practical influencing factors of mobility than US-EU mobile researchers. Young industry researchers seemed to attach more importance to all practical factors than any other group of respondents.

Profession-related influencing factors (related to the researcher's career or profession such as the 'maintenance of network contacts' and 'obtaining funding') also seemed to be of relatively low importance among the researchers. These factors seem to constitute barriers to mobility rather than being facilitating factors.

The survey asked about the most important motivations for geographical mobility. The researchers, in general, did not seem to attach a very important role to personal motives (referring to personal and culture-related motives) concerning their decision to become mobile. However, different sub-groups did attach relatively higher importance to these motives. Non-mobile researchers considered personal or family-related motives to be more important for their mobility decision, whereas industry researchers viewed culture-related motives as more important in their decision.

Profession-related motives (referring to motivations related to the career or the profession of the researchers (e.g. 'personal research agenda', 'career progression goals', 'career opportunities at new location', 'salary and other financial incentives', etc.) received higher importance as motivation for international mobility than personal motivations. Industry researchers considered profession-related motives to be of high importance, especially regarding access to research facilities and prospects for working with leading experts.³

In August 2013, when the empirical work for the present study was finalised, the continuation project MORE2 was published. The objective of MORE 2 was to provide internationally comparable data, indicators and analysis in order to support further evidence-based policy development on the research profession at the European and national levels. The study was conducted through two large-scale surveys and two case studies, and also included the development of a set of indicators.

The study found, amongst other things, that there are more male than female researchers, particularly in the higher career stages of the research profession, and that female researchers are less satisfied than their male colleagues with the opportunities for advancement offered. MORE2 found that researchers earn less in Europe than in the US. The majority of researchers also report that remuneration and career progression are generally better outside the EU.

According to the study, most EU researchers currently working outside Europe still have strong ties with Europe and many consider moving back. The problems they face in moving back are difficulties finding a suitable research position, keeping their salary and/or obtaining funding, and finding a job for their spouse. Overall, the majority of the >3 months internationally mobile researchers feel that mobility has had positive effects on several aspects of their career as a researcher.⁴

1.3.2 The Rindicate study

In 2008, the Rindicate group published the study *Evidence on the main factors inhibiting mobility and career development of researchers* as commissioned by the European Commission. The aim of the study was to present evidence of factors that may inhibit transnational mobility and career development within the emerging European Research Area, as viewed by researchers.

The study was performed using a survey as well as interviews with people responsible for research management across European organisations. The purpose of the survey was to capture EU researchers' demographic data and identify the factors that inhibit mobility and career development. Eight countries were selected for inclusion: Hungary, France, Germany, the Netherlands, Norway, Poland, Spain and the United Kingdom.

The survey concluded that 82 per cent of the respondents had been mobile or would like to be mobile in the future. The share of researchers who are currently mobile was highest for the age group 25-30 years old. Results also showed that researchers with a fixed-term contract of more than two years were more likely to have been mobile in the past, or not to be currently interested in mobility, compared to those with a shorter fixed-term contract.

A great concern amongst researchers considering future mobility is a potential lack of recognition of, and fewer opportunities for, further career progression directly linked to mobility status. Funding for mobility is of great importance for those who would like to be mobile in the future, and is also seen as

³ IDEA Consult (2010). Study on mobility patterns and career paths of EU researchers. Final report, MORE. Prepared for the European Commission, Research Directorate-General Directorate C – European Research Area, Universities and Researchers. Brussels

⁴ IDEA Consult (2013). Support for continued data collection and analysis concerning mobility patterns and career paths of researchers. Final report, MORE2. Prepared for the European Commission, Research Directorate-General Directorate B – European Research Area. Brussels

a significant potential obstacle by those researchers who are not currently interested in being mobile. Other important factors are personal relationships, accommodation, social security, salary, pension rights and healthcare insurance. Immigration rules are of greatest significance for researchers from other countries outside Europe.

Accommodation presented a problem for 50 per cent of respondents. Findings also showed that mobility could affect supplementary pension and disadvantage researchers later in life. There are also major concerns regarding researcher mobility and career progression relating to the lack of job security and stability for researchers.⁵

1.4 Outline

The outline of this report is largely shaped by the distinction that we have chosen to make between a few categories of factors that influence mobility – positively or negatively. First of all, we distinguished between private and professional factors. Private factors include aspects such as family situation, a desire to live in another place or change job for the change as such, and bureaucratic and administrative challenges that come with moving abroad. Professional factors include all issues that have to do with work as such, including possibilities for employment.

Secondly, with regard to professional activities we separated factors that primarily have to do with research as such – the creation of knowledge – from factors that predominantly concern platforms to conduct research, such as employment position and networks of strategic importance. In other words, we attempted to separate factors that to the researchers primarily concern the *content* of what they do from the *framework* within which they do it.

Chapter 2 contains findings that relate to knowledge creation, which in turn are separated into opportunities for knowledge exchange and empirical studies, respectively, working conditions – which concern issues intimately related to knowledge creation – and finally issues related to independence and spaces for action as a researcher. Chapter 3 concerns factors that primarily are related to career-strategic considerations, and is divided into three main parts: finding employment, establishing strategic networks, and finally the merits and impacts that the mobility experiences have had for the researchers. In the fourth chapter we present and discuss factors related to private life. That chapter consists of three sections – one on mobility to experience something fun or interesting, one on family-related aspects, and one on practical issues such as social security and administrative challenges. Chapter 5 covers support for temporary mobility, both how such mobility can be funded, and observations on the support that universities and companies offer. In the sixth and final chapter we first, in a condensed format, present our conclusions with regard to drivers and motivations as well as barriers, after which we add our most important reflections as well as the policy implications that we have identified.

5 PREST (2008). Evidence on the main factors inhibiting mobility and career development of researchers. Final report, Rindicate. Prepared for the European Commission, Research Directorate-General Directorate: European Research Area, Universities and Researchers. Manchester and Brussels.

2. Mobility and knowledge creation

In this chapter we present findings and observations on aspects of research mobility that primarily have to do with research as such – the creation of knowledge. Such aspects include opportunities for knowledge exchange, opportunities to conduct empirical studies, working conditions, and cases where researchers choose to be mobile to increase their latitude for action, such as to write papers without being disturbed or to carry out their own research agendas. All factors that we bring up in this chapter are closely linked to factors of concern for the next chapter, which focuses on research mobility for career-strategic reasons.

2.1 Opportunities for knowledge exchange

Personal capacity building through meeting new, competent people is a reason commonly cited for research mobility. This is especially mentioned by university researchers who go on temporary trips abroad and by industry researchers who accept adjunct professorships at universities. The researchers want to gain deeper a understanding of the phenomena they are interested in by going to other researchers or research environments that are known for being at the research forefront. What they seek is the opportunity to discuss and compare their understanding with others.

The ‘creative friction’ in rubbing one’s ideas against the ideas of others is the core of all learning, but research is special because of the advanced level of knowledge – one might have to travel halfway around the globe to find someone who can challenge one’s ideas.

Mobility should be understood as a complement to intellectual exchange via e.g. e-mail, telephone, or meetings at conferences. The latter are short-term breaks with the modes of thinking the researcher is used to confronting in his or her everyday environment. Spending time in another research environment is a way to open up for a more profound challenge to one’s patterns of thinking – in one way or another, there will be less chance to return one’s thoughts to the usual patterns. To be mobile as a researcher is to ‘intellectually de-couple’ from the professional context one is used to.

One example of a researcher who was motivated to engage in mobility for this reason is a mathematician who has been to a number of places for 6-12 months each. The mathematician succinctly explains:

I wanted to know more about how to use mathematics, so I contacted my scientific idols and in every single case I was invited to visit them. That’s the whole story!

Another aspect of this kind of mobility is the chance of finding openings for new lines of research. For instance, a natural scientist went for a half-year long stay abroad because “they had developed a new visual method”.

Researchers who have spent time at leading universities in the US or UK often emphasise the inspiration and opportunities that come from being in ‘global research hubs’ with networks and resources that far exceed any Nordic university. In the words of a post-doc at one of the most prestigious US universities:

[This university] is very open, lots of other environments, lots of guests, courses, seminars, all the time. I already knew that when I applied to get here. It’s easy to arrange collaborations, also with other universities here in the US. No doors are closed. You can get great inspiration.

Extensive research discussions often return ideas for new projects which the partners might want to explore together. Mobility is also good in this respect: researchers will be able to work better together if they spend an extended period of time with each other. Efficiency in research collaborations is largely

based on shared understandings of what will be done, on established procedures and on trust in each other's competencies and ways of working. When researchers meet they are able to screen each other's competencies and 'tune in' to each other, which will make collaborations run smoother.

2.2 Opportunities for empirical studies

Mobility to gain intellectual inspiration might also concern opportunities for empirical research, typically by access to specific research infrastructure or proximity to specific phenomena of study.

Access to research infrastructure is naturally a key aspect of mobility to institutions that have large-scale facilities such as the Large Hadron Collider at CERN in Geneva, Stanford Linear Accelerator Center in San Francisco or other infrastructure that exists only in very few places.

However, mobility is more commonly induced by much more ordinary research infrastructure where the attractiveness primarily lies in the whole setup of the environment. Each 'piece of equipment' might be standard in many research settings, but the whole local environment with instruments, computer programmes, data, etc. might be specific in ways that make them hard to reproduce elsewhere. Technical equipment and data are obviously important in the natural sciences, medicine and engineering, but researchers in the social sciences and humanities might be attracted by archives or specific databases, for example.

Staff exchange between companies and universities is often stimulated by well-equipped local environments; universities typically attract companies with equipment such as advanced microscopes and superior labs for explorative studies, while companies typically can offer environments for more large-scale testing and extensive data on 'real things'.

Mobility of this kind is generally much shorter than the three-month threshold applied in this study; it rarely lasts more than a few weeks in total. A few respondents have spent considerable time in a company/university with access to research infrastructure as the main motive. One of them was able to spend 50 per cent of a full-time position for three years in a university lab, running a development project for a biotechnology firm while also publishing studies in scientific journals. Adjunct professors often point to access to infrastructure as 'important', but often add that the hands-on work should be carried out by PhD students or technical staff under their supervision.

The importance of this type of mobility is likely to increase in the coming years. Already today it is often a natural aspect of ordinary collaboration projects. With increasingly sophisticated technologies and testing needs, etc., researchers will likely have to travel to places where such studies can be carried out. The mobility might also be induced by plain economic considerations; an adjunct professor from a large Swedish automotive company notes that as research infrastructure becomes increasingly expensive, universities are forced to develop contacts with industry that can pay for use of the equipment.

Mobility for infrastructure reasons might also increase in the human sciences. For instance, a respondent who works in a large insurance company stresses that thanks to increasingly powerful systems for information handling, many companies possess datasets that enable studies of great interest to the scientific community. Companies for their part should be interested in sophisticated analyses of e.g. customer behaviour, the respondent argues. Opportunities to work with such datasets could induce permanent researcher mobility from universities to companies. If the often complicated legal issues and questions of integrity can be solved, such dataset analyses could also lead to a temporary exchange of personnel.

Researchers at Icelandic universities find travel for infrastructure reasons more common than researchers in the other countries do. Icelandic researchers in the humanities especially point to the need for access to good libraries. Although the Icelandic library system is well organised to handle both domestic and international exchange of books, it seems that travel to research institutions abroad is often motivated by access to well-equipped libraries.

Finally, university researchers who are studying phenomena that only exist in specific places might have to go abroad to conduct empirical studies. Such trips sometimes involve stays at universities in these places. We did a couple of interviews with researchers in the humanities and social sciences who stud-

ied e.g. culture, literature or welfare systems linked to specific places or regions abroad. When locating respondents we also noted volcanologists, botanists and zoologists and others who had made longer research visits to universities in regions that host their scientific speciality.

Of course, empirical work while being mobile is not always the main reason to be mobile. One example is a social scientist who went to a leading research centre in the US:

I got a great view into how a leading research environment works. I have also read a lot more US research and benefitted greatly from the generous reception from the researchers at the centre. I also did qualitative empirical research, that was fantastic – how does it work when you are [dependent on a specific welfare system] in the US?

2.3 Working conditions

The attractiveness of research environments not only lies in who works there and which infrastructure is in place, but also on working conditions such as organisational strategies, leadership and atmosphere at work. The wage level matters too.

A common belief is that wage is a key motive underlying permanent mobility from universities to industry. Our data give a somewhat different picture. Although wages are generally higher in industry, the respondents typically state that other motives are more important, most notably organisational governance and culture. A lawyer says, “I left academia for industry because I found academic work too lonely” and a researcher at a biotechnology firm left university shortly after the post-doc period because she wanted to put more of her energy into actually doing research – a motive that arguably is contrary to the picture many of us have of how university and industry researchers spend their time. The researcher says:

At the university everything is a competition – from applying for grants to getting administrative support. You must do everything on your own. In industry you work as a group.

What these two respondents point out (and appreciate) is the often deeper division of labour that companies have – a researcher in industry typically spends his or her day mostly doing research, while at universities research might be a minor activity in addition to teaching and various administrative tasks, something that those who primarily identify themselves as researchers might find frustrating.

An obvious benefit of being a university researcher is the more extensive freedom in choosing which research to conduct, which of course is highly attractive to many researchers. Scott Stern, who has studied biologists in the US, has even shown a negative relationship between freedom in research and wage level, and concluded that “scientists pay to be scientists”.⁶ We see little reason why this would be different in the Nordic countries, although it is important to keep in mind the often substantial wage differences between industry researchers ‘on the floor’, who often have repetitive work tasks (and only very rarely a PhD), and industry researchers with management tasks. Mobility to gain better opportunities to conduct research is also often strongly connected to the employment situation as such, which will be further discussed in section 3.1.

In light of this, the increased strategic management of universities in the Nordic countries might affect mobility in two ways: first by increasing or decreasing job opportunities depending on the field, and secondly by decreasing research freedom especially for junior researchers who then might find the conditions and wages in industry relatively more attractive. One respondent in Denmark pointed out such university governance as a main contributing factor behind his move to a company.

Several respondents motivate their mobility from academia to industry or vice versa with opportunities to continue with R&D also when resources are unpredictable or dwindling. The empirical material contains examples of such mobility going either way – university researchers with an interest in applied research and who are dependent on external funding have left their universities for positions in

6 Stern, Scott (2004). Do Scientists Pay to Be Scientists? *Management Science* 50 (6) pp. 835-853.

industry, and industry researchers who have seen their company budgets for R&D decline have looked to universities for the opportunity to continue their research.

On a more fundamental level, mobility for the reasons cited above concern researchers who feel constrained in their individual knowledge creation. Loneliness, competition, lack of division of labour, lack of resources, a feeling of being crowded out – are all motives that express disharmony between what the researcher wants to do as a professional and the opportunities his or her organisation offers.

However, mobility induced by (poor) working conditions need not occur because the working conditions are better elsewhere – sometimes the change as such can be motivating enough. One respondent's motivation to shift from a permanent position as a university professor to running a start-up company was a desire to change the environment and do something different. This argument is probably common among university researchers who decide to start their own companies.

The same argument has also been put forward by university researchers who conduct temporary stays abroad. For instance, one researcher says:

I would probably have chosen another job if I weren't able to be mobile. The mobility has not had any impact on my career as such, but without it I would have felt trapped; I need new impulses.

Another researcher argues along the same lines, but puts more weight on the role of mobility for the quality of university environments:

Being away is refreshing, you return with your batteries recharged. You become a better colleague, which benefits the department. An academic has to keep up; students discover if you are outdated.

Statements like these should be understood in relation to the labour market for university researchers. If one wants to work at a university, there is typically only one employer in town. In very big cities there might be two or three, but perhaps with different scientific profiles and located far from each other. Thus, if a university researcher feels that his or her everyday environment has become a bit dull and wants a change, going abroad for half year in the hope of coming back with new energy would seem more attractive to many researchers than permanently moving to another place and finding a new position, especially if they have families. Leaving the university for a local company might also seem unattractive, since it would be almost impossible to return to a permanent university position later on. When industry researchers experience the same feelings, they often have several local employers to choose from. The threshold of changing employer in industry is thus lower. Relatively few of the industry researchers interviewed have moved to other cities when they have left the university for a company, which might indicate the relevance of this point.

2.4 Independence

A significant number of respondents mention a desire for independence as the motive for mobility. The point has most frequently been made by university researchers who have been on temporary stays abroad, but it has also been touched upon by a few researchers in industry who have been adjunct professors. A couple of post-docs have made a similar point as well, arguing that research careers are best built when young scholars are free to plan and run their own research projects, and that a couple of years at a foreign university with individual funding from the home country tends to create a favourable situation. These two points will be further developed in this section.

2.4.1 Temporary stays as ‘pockets of productivity’

Among university researchers who have been on temporary visits abroad, it is common to cite opportunities for increased research productivity as a major motive behind the stay. Although some of them are able to spend a significant proportion of their time at their home university on research, they argue that they become more productive while being away. They primarily explain the increased productivity not only by having the full days available for research; they are also able to focus and plan their time better. A researcher who is away from the day-to-day activities in the home environment is disturbed much less. For instance, they are not interrupted by e-mails, phone calls, students or colleagues, or by pressing needs to spend time on teaching or administrative duties. One example:

The most important reason for my three months abroad was that I normally spend most of my time teaching. It is difficult to find peace for research and writing. I needed to get away from my students to finish a paper and to work with my data.

In addition, researchers who have considerably more time for research make the same point, such as one professor who has 45 per cent research in his employment contract and the opportunity to take a one-year sabbatical every six years. He always makes use of his sabbatical, every time for half-year long stays at one and the same foreign university:

I collaborate with researchers [in that place], but the most important thing, to be honest, is that I get six months without teaching. The faculty won't allow me that unless I travel abroad.

Researchers at the University of Iceland have regular half-year long sabbaticals as part of their employment contracts, an issue that will be further discussed in section 5.2.3. An Icelandic respondent argues that international exchange is not the only motive for making use of the sabbatical:

If you stay at the university you don't get the time you need to dig into research. [A sabbatical] is a kind of escape when you can really concentrate on your research and writing.

Along the same lines, several Icelandic researchers observe that longer stays abroad have become more important after the national economic crisis, which led to a significant increase in mandatory teaching hours and therefore less time for research.

The drawback of temporary visits is the risk of weak embeddedness in the new research environment and thus a feeling of loneliness, which can make the visit less inspiring or even less productive than it could have been. A handful of respondents make this point. One of them says:

One must be prepared for the loneliness, have a plan on how to tackle it, have learned from others who have been away... After a while it will get easier, but you have to be active, for example present papers in seminars.

Another researcher travelled abroad as a visiting post-doc and was not given any office; he had to work in the university library. It is common that early-career scholars, especially in the humanities and social sciences, are not provided with any office space, which can make the stay a lonely experience since the natural day-to-day interaction with researchers at the host department is missing.

2.4.2 Stepping out of the shadows of senior researchers

One potential upside with weak embeddedness in the local host research environment is that the researcher may experience better opportunities to shape his or her own work; he or she is little influenced by senior research leaders. For young scholars the opportunity to step out of the shadow of senior researchers – for example their former supervisors – is much desired, sometimes almost necessary to lay the foundation for an independent career that eventually may involve leading one's own research group. A couple of post-docs make this point. One of them, a post-doc at a prestigious US university, says:

I wanted to leave after my PhD. I think that many people feel it's a kind of liberation process from your supervisors, no matter if the relations with them were good, as in my case.

Later in the interview the same respondent returned to the issue, specifically pointing out how one can create weaker embeddedness by going abroad with individual funding by playing potential hosts against each other:

As a post-doc you have a supervisor too, but it's much freer. I wouldn't have accepted anyone who had a plan for me. I get that freedom through my funding. It is my money, not my supervisor's... If you go abroad you make it more to a seller's market, there are more research groups to choose between and you won't be that dependent on your post-doc supervisor.

Another researcher, also currently a post-doc abroad, thinks along the same lines and reflects upon the potential drawbacks of returning to the same research environment where he received his PhD:

It would be easy to get back, there is no doubt I could continue my career there. But it is easy to slip into your old role. You will go to the same meetings, teach the same courses and so on. My former supervisor will be there and be much better than me at the same things that I do. My role now as a post-doc is that I occupy my own niche and I can supervise a few students – I get a kick out of that role.

It is possible that similar issues of independence underlie the reason that senior researchers also move to other universities and that researchers move between sectors or from one company to another. In the empirical material for this study, however, post-docs were the only ones who brought up the issue.

3. Mobility and career

This chapter deals with the more career-strategic considerations behind research mobility: How can mobility pave the way for a career the researcher wants to have? The chapter begins with the most fundamental issue: to have employment. The second section discusses ways in which mobility can create networks of strategic importance, which can also be used long after the researcher has moved on. Considerable attention is paid to organisational interests in networks – most notably, a company rarely lets its employees engage in temporary mobility to universities without making sure that the mobility can help to meet the company's other, broader goals. Finally, the chapter also discusses how the researchers have benefitted from being mobile in terms of merits and impacts on their careers. We also reflect briefly on the impact that mobility may have on the researchers' identities and on their research environments.

3.1 Finding employment

In this study unstable positions in the previous organisation were clearly the most important reason behind mobility to permanent positions. This applies to both inter-sectorial mobility and international mobility of university researchers. In most cases the respondents present such mobility as 'enforced' to some extent, either in order to pursue a career that is acceptable in their own eyes or merely as a response to avoid unemployment.

With regard to inter-sectorial mobility, several respondents who work in industry say they left academia because they could not find a permanent position there or they were too dependent on external funding (see also section 2.3 on working conditions). One respondent, a Swedish PhD in biomedicine in his late 30s, refers to a lack of ability to make plans for the future as the main reason behind the move:

I wanted to get away from the stress and uncertainty in academia. There are no permanent positions, you cannot make a living. You won't get housing loans – the bank does not understand that your publications might lead to a new project.

The same respondent continued:

In addition, I am a clinician but not a medical doctor, which means that it is difficult for me to attract funding and make a career; my career prospects have never been in academia... None of the colleagues I had as PhD students in [my field] have stayed in academia.

Another interviewee, a Danish PhD in physics, just over 30 years old, argues along similar lines as to why he left for a company job after unsuccessfully applying for a couple of post-doc positions:

In order to attain a permanent position in academia you have to go abroad for at least two years and be a post-doctoral fellow, and when you get home, you have to have temporary scholarships before you can get anything permanent. You avoid all this if you change sector – and you also get a good salary. That gives a different kind of security.

Those interviewees who have been more determined to stay in academia than the two respondents just cited – and who arguably valued aspects of their private and family lives differently – have sometimes viewed international mobility as the only way forward. The career track of one respondent, around 40 years old, illustrates the picture well:

I did my PhD in the US, with field studies in [another country] around half of my time. Then I got a post-doc at another US university, with field studies a few months per year in [another country]. I then did a post-doc at a third US university, and then a third one at a fourth university. Then I did a fourth post-doc in [a European country] before coming to [a Nordic country]. I will soon move to [another European country] for my first permanent position... What matters to me when I move is the intellectual energy and the quality of research that is being done. I like big universities, smaller places cannot compete.

However, not all university researchers are able to move to attractive environments; in many cases researchers have to move to less prominent institutions merely because these are the only institutions that offer employment. In some cases researchers accept these positions with the intention of moving to more prestigious universities later on. In other cases they conclude that the low status environment is good enough – for some researchers perhaps even better than high status environments with well-established colleagues would have been, as they might get better opportunities to build a stable platform to realise their own ideas.

An illuminating example in this study of a university researcher choosing a low status environment to remain in academia was a researcher who after finishing a PhD accepted a faculty position at a Latvian university with comparably low status before moving to a small university in one of the Nordic countries.

One example of a university researcher who chose to stay in a foreign, low status environment is a respondent who says: “I badly wanted to become a professor in [this discipline], it was a most heartfelt desire that I had already during my undergraduate studies.” The dream has come true – the respondent is a professor in that discipline, but at a university college in a Nordic country where the respondent was not born and had not intended to live. The researcher tries to compensate for the situation by finding room for longer stays abroad; moving to another place is no longer an option for family reasons.

Situations where researchers who made permanent moves had the status to pick and choose between universities are uncommon in our material, but they do exist: A young natural scientist was able to play a couple of leading Nordic universities against each other:

After my post-doc at [a prestigious US university] I wanted to live closer to my husband. I also wanted to start my own group. So my minimum requirement was a five-year contract. I chose [the university where I work now] because of the location and the permanent position that I was offered.

The respondent is now employed at a university in a Nordic country that is not her native country, and after some time her husband was able find a job in the same city.

On the other end of the scale, not all researchers are interested in ‘making careers’; some are mainly interested in having a job that provides an income – in other words, their professional interests are subordinate to their other interests. One interviewee, a natural scientist, defines herself into this category because of family reasons:

I had to move to industry [directly after PhD graduation] since I was unemployed. There are not many jobs in my scientific field in this part of the country... My wage in the company is lower than it was when I was a PhD student at the university... For my career, this change wasn't good. I don't even work with research anymore. But personally, the change was the right thing to do. I had small kids; it was nice to have 'an ordinary job'. I didn't forget to pick up the kids in the day-care because of my research experiments – that happened before! It is also a gender issue, it is difficult for my husband to come along and take care of the kids; he has three times higher wage than I have.

Although examples like this fall outside the ongoing discussion of the benefits of inter-sectorial mobility, they nevertheless deserve to be mentioned as examples of mobility that seem mostly negative from a utility perspective.

3.2 Strategic networks and collaborations

3.2.1 Employer interests in inter-sectorial mobility

Inter-sectorial mobility for strategic networking reasons primarily seems to be a question for the employer, both companies and universities. Although researchers in industry who maintain links with universities certainly have a personal interest in these connections, almost all such respondents in this study emphasise that company interests are top priority and that these priorities significantly restrict the researchers' latitude for action.

The interest that companies have in inter-sectorial mobility should be understood in relation to the basic interests that companies have in university collaborations, which can be summarised in five points:

- *Knowledge outputs*: Improved product and process development; development of tools, techniques, datasets, etc.; creation of IPR; and 'leverage' of R&D budgets;
- *Recruitment*: Get in touch with students and researchers who can be employed in the company;
- *Strategic outputs within the firm*: Enter or strengthen positions in specific technologies; secure access to fundamental knowledge or equipment; attain R&D results in student or researcher projects to set (or eliminate) directions of R&D; learn to organise R&D activities in new ways such as 'open innovation';
- *Networks*: Enhanced reputation among scientists as well as clients; access to new funding streams and partners;
- *'Focusing devices'*: Give the company a chance to signal areas that universities should focus on; increase the supply of human capital in areas relevant to the company.

Firms put different weight on these aspects depending on e.g. their size, industry sector, and the scientific environments with which they collaborate. In this study many respondents in industry work for large engineering-based corporations, and typically refer to long-term interests such as recruitment of staff, 'R&D probing' through master's degree papers, and the potential to shape university research agendas as important to their companies. Respondents who work in smaller firms in the biotechnology sector point out applicable results as the main reason for collaboration. A respondent in a law firm argues that the possibility to show clients that their employees combine law practice with research is the most important reason for law firms to fund adjunct professors.

One way for companies to satisfy the listed interests is to fund staff mobility across the interface with universities, such as adjunct professorships or university researchers who spend part of their time in the companies. Companies typically have great influence over such arrangements. A clear example of this is a respondent whose company management wanted to develop links with a specific university and therefore arranged an adjunct professorship. Only after the arrangement was made did the company management ask the respondent – who at that point was unaware of the whole process – if she wanted to spend one day a week at the university.

In addition, firms typically do not want their employees to do too much research as adjunct professors. One day a week (20 per cent of full-time employment) seems to be common for adjunct professors in the Nordic countries. That barely gives these researchers any chance to engage seriously in scientific research and publishing; almost all respondents in such positions spend their university time mostly teaching and supervising PhD students. Almost all of them believe that their employers would not like them to spend two days a week at the university, which would enable them to spend more time on research. However, a couple of these researchers observe that their competencies and networks are of significant strategic value to the companies, which potentially enable the researchers to renegotiate the terms as the firms would not want to lose important staff. For more on adjunct professorships, see section 5.3.

A growing trend internationally is that large firms sign partnership agreements with a selected number of universities, instead of working with more specific research groups in a larger number of places and universities. One Swedish respondent presents his ongoing move of adjunct professorship from one university to another as part of this trend:

We don't want to be part of the centre at [the previous university] anymore, partly because we are now positioning ourselves within [the global corporation that owns us]. We then believe that fewer university partners are good for us... [The new university] also has great research infrastructure, which is important to us alongside its competence and preferred format of collaboration.

He also adds that the company, as part of the partnership, hopes to increase its number of adjunct professorships, but that the new university should in return co-fund the adjunct professorships – “That would be a good sign of commitment from the university” – a standpoint that diverges from common practice where adjunct professorships are funded by the companies alone. We are not in a position to estimate the extent to which the example is part of a trend, but if it is, it seems that Nordic universities have a delicate issue of strategic importance to handle with regard to research mobility.

Industry researchers who spend part of their time at universities and university researchers who partly work for companies might find several reasons for how such mobility can be of strategic importance to them. One reason is that they can improve their scientific track record and competence as researchers by working with people with complementary competencies and by accessing good infrastructure or data. On this point, several industry respondents specifically underline the importance of staying updated – the knowledge they developed during their PhD studies or earlier as university researchers becomes outdated after awhile, and they lose some of their analytical skills if they do not use them continuously. Knowing is above all a practice.

Another reason to be mobile on a part-time basis is that researchers who stand with one foot in each sector occupy positions of strategic importance – several respondents point out that the ability to “speak to and understand both researchers and technicians” and thereby be legitimate in the eyes of both groups is quite uncommon. A related consequence is that boundary-crossing individuals tend to develop good networks in both camps, which is relatively unusual to have. ‘Learning about the other side’ and its ways of working, interests and drivers is widely held as important.

A few respondents also mention that they like to keep doors open for their future careers. Adjunct professorships are strategic because they imply that the researchers’ competencies are evaluated to ensure that they have professorial competence. That status, together with networks and new knowledge, means that the researcher may have a chance to return to the university – a step that is widely held as very difficult to take as universities normally put most weight on publication records, which for industry researchers are almost always weak.

Similarly, university researchers might maintain links with company researchers to pave the way for a future career in industry, such as a researcher who did a post-doc partly on the premises of a company:

I always wanted to have a career in industry. I did my PhD to get knowledge that I could use in industry, and I did my post-doc just to have something to do while I was looking for a real job in industry.

Less frequently mentioned in the interviews, but highlighted by one respondent in particular, is that being a boundary-crossing researcher might create the potential to do things that are important but that do not really fit in anywhere – in some sectors there are gaps between what universities, institutes and companies are willing to do. The respondent, a long-standing adjunct professor whose time at the university is no longer funded by any company, concludes that the only way for her to run the applied research she wants to run – and which she knows is desired by both academia and industry – is to secure her own personal funding and convince a university to let her be an affiliated scholar. She locates her funding in national agencies that fund sector research or through her personal networks in the institutes and the industry sectors.

Universities too have interests in inter-sectorial mobility, primarily because it is an important channel for ensuring that their research activities are useful for the rest of society, and for gaining access to new resources. Many Nordic universities actively work to ensure some inter-sectorial mobility – notably, almost all adjunct professors interviewed for this study were appointed on the initiative of the universities

rather than themselves or their companies. In addition, universities make use of industry researchers in undergraduate education to prepare the students for their potential future labour markets by e.g. exposing them to ‘real cases’.

3.2.2 International mobility as part of academic career planning

Besides being internationally mobile for the sake of knowledge creation, academic researchers might also have career-strategic reasons to spend a couple of months abroad or to take up a position at a university in another country. These reasons, which mainly concern the development of personal networks, making oneself known by being present in ‘the right places’, and building a strong CV, are closely intertwined with the reasons mentioned especially in section 2.1 on knowledge creation. However, since they mainly concern strategic positioning they are distinctly different from knowledge creation as such.

Spending time abroad enables the formation of new or strengthened strategic networks and collaborations, which give (better) opportunities for researchers to realise their ideas. For instance, it might make it easier to attract funding, publish in attractive journals, or attract good PhD students and post-docs. Quite a few respondents reflect on these issues.

Temporary mobility often has the purpose of establishing networks that one can draw on for a long time. As one researcher puts it, “Before going you have to consider what you should do when you get home – how will the contacts be used?” Quite a few respondents also underline that efficient collaboration requires that the partners get to know each other well. The mobility is thus only one part of a much longer process.

Good networks may be used in many ways. One aspect that several respondents emphasise is that they pave the way for good publications, and that Nordic researchers often have good reasons to think strategically in this respect. A social scientist (29) observes:

Travelling makes it easier to get good publications. It is really hard to get published in the best American journals unless you collaborate with American researchers.

This researcher adds that empirical studies only based on data from the Nordic countries will find it very difficult to make it into the most prestigious American journals.

Good networks also make it easier to get access to specific high-quality conferences, workshops and seminars. For example, one Danish respondent notes the existence of an informal ‘elite cluster’ in the subfield and argues that once one has been granted access to one of the research environments in the cluster, one has good access to the other environments as well. An interviewed post-doc arguably thinks along the same lines when stating:

My post-doc will mean everything to my career. My PhD was an education. Now I develop my profile as a researcher. I expect great benefits from my post-doc time [at a prestigious US university] even if I am stuck in [my home country] for the rest of my career.

Several researchers also note that it can be beneficial to have a stay at a prestigious foreign university on the CV. One of them is especially open about that:

I decided to spend a full sabbatical year in [an attractive place]. I have a visiting fellowship at [a nearby well-known university] but I almost entirely work from home. It is not a good fit regarding research topics and contacts, but it is better to be affiliated and have it on the CV.

But depending on what career one considers, and on the circumstances in one's home organisation, it might sometimes be a better option to stay at home. Several respondents have noted resistance from their university department when they wanted to stop teaching and felt a general lack of support from the department leadership (these issues will be further elaborated in section 5.2).

Early-career researchers and researchers on temporary contracts may therefore conclude that staying is a better option for ensuring a permanent position, see also section 3.2.3. On a similar note, one respondent at a Danish university states that some of her colleagues had to justify and explain stays abroad that were longer than the ordinary when applying for permanent positions; mobility was thus potentially held against them. One Norwegian respondent also expresses disappointment over occasional negative attitudes towards international mobility and collaborations among national research funders:

I have had research proposals that involve [partners at foreign universities] rejected with the comment that I just as well could collaborate with Norwegian partners.

3.2.3 Post-doc repatriation

A specific case in academic career planning concerns repatriation of post-docs. The post-doc period is limited in time, but it is also a career stage that is expected to take place abroad before returning to university positions in the home country; this is especially the case in the natural sciences and medicine and in parts of the engineering field. A situation in which there is increased competition for university positions, and much local funding in Nordic universities is controlled by (teams of) senior researchers, might put post-doc scholars abroad in challenging situations – it is generally easier to maintain one's networks and monitor available funding and positions while being locally present. It might even discourage some young scholars from going abroad at all. One former Swedish post-doc has an experience that is probably common for many Nordic post-docs:

I lost my position during my post-doc but that was part of the plan, I intended to look for new jobs towards the end of the post-doc period. Now I am back right where I started. My PhD supervisor called me during my post-doc and wanted me to come back. My field is so small; if I wanted to get back to academic research in Sweden it would have been difficult to find another place.

Our empirical material indicates that repatriation challenges primarily are issues for post-docs who want to return to Denmark and Finland. In these countries almost all available post-doc funding only covers the stays abroad.

Until recently post-doc repatriation was also a challenge in Sweden, but most large Swedish funding agencies have repackaged their post-doc funding to address the problem. Swedish international post-doc funding used to consist of two-year scholarships. Now the funding typically extends over three years, of which up to one year can be spent at a Swedish university, which also must be the employer for all three years. The latter implies that post-docs are not disfavoured in the Swedish social security system, which is the case when funding is awarded as scholarships.

In Norway post-doc repatriation seems to have been less of a problem, since the dominant funder, the Research Council of Norway, usually incorporates post-doc funding in grants for research groups. Sending post-docs abroad in that way becomes a strategic tool for research groups, which typically want return on the 'investment' by getting the post-doc back in the group later on. A potential downside is that Norwegian post-docs may be less able than other Nordic post-docs to independently plan their careers.

3.3 Merits and impact on career

3.3.1 Merit and impact of inter-sectorial mobility

It is generally a significant merit to have a PhD and work in industry, where PhDs are often quite rare. A researcher with a PhD therefore tends to have a high informal (and often also formal) status in the company – and certainly higher status than at universities where more or less everyone has a PhD. Adjunct professors from industry interviewed in this study specifically mention the status aspect as positive personal outcomes of their adjunct professorships, as such positions require that one has been evaluated to have competence equivalent to a professor, which is a merit in the company. They also get status from having personal networks in academia. A PhD and documented scientific record can also help the company attract customers.

However, several adjunct professors from large companies mention that it can be difficult to convince company managers who are not R&D specialists about the value of using part-time staff mobility to form bridges to universities. On a similar note, one respondent concludes that being an adjunct professor is mostly negative for his corporate career and probably has had a negative impact on his wage:

Nobody questions my CV. But careers are a lot about contacts, you have to be friends with the right people, hang out with the top management to climb to the top in the internal hierarchy. For my career it would probably be better to spend 100 per cent of my time in the company.

In addition, having positions in both universities and companies can be negative for work efficiency, probably in a way that is more negative for the scientific work than for the company tasks. A couple of adjunct professors observe how during their ‘university day’ they also have to be available on the phone or e-mail just like in the ordinary days in the company. One of them says: “I check my company e-mail all the time. It is important to keep in mind who pays my wage!” Another respondent notes how the need to stay alert has worsened after he got a manager position with many responsibilities other than performing R&D.

Forming a bridge across the university-company interface is mostly a positive merit, but is also somewhat risky; the individual invests in a position that he or she does not know for sure will be valuable in the long run. One respondent learned first-hand about this risk when her company changed business strategy. At that time she was halfway through her contract at a university where she worked 50 per cent, paid by the company. As a consequence of the reorientation the researcher’s employment at the company was terminated. The researcher believes, however, that the combination of extensive academic and industry experience might still help her future career.

Almost all respondents note that going from universities to industry increases the wage, sometimes quite considerably. An important exception, however, is mobility to some newly established high-tech companies where wages are often relatively modest until there is a product on the market. In such cases researchers sometimes try to retain their employment at the university while also working for the company.

Inter-sectorial mobility from industry to academia appears considerably less meriting than the mobility in the other direction. The weak publication records that most industry researchers have are clearly negative merits in the academic world. Quite a few respondents, including the adjunct professors interviewed, also think their industry experience, insights in applications, and industry networks would not be valued particularly high in academia, at least not outside the local university departments.

3.3.2 International mobility as an academic merit

International mobility as academic researchers generally seems beneficial for a career as a researcher – but in most cases only indirectly by paving the way for publications, project partners, funding, etc. Most academic respondents observe that international research mobility as such is only marginally meriting when researchers apply for university positions or funding, also in disciplines where post-docs abroad are common.

However, there is one important exception to this general picture: In Denmark three of the four respondents at the post-doc or assistant professor levels mentioned that their home institutions expected them to go abroad. Two of them also said that international experience was required to get a permanent position. In one case the department demanded at least one year abroad for anyone who aspired to get a position as associate professor.

The greatest direct merit of having been internationally mobile seems to be found in the status the researcher has in the local environment. As one respondent puts it:

[Being mobile] shows that you are active, that you have ambitions for your research, and that you want to have new influences. You can notice in the relations with your colleagues that it is a merit.

Several interviewees make similar points, usually also by including that the mobility indicates that a researcher has developed international networks and hopefully also collaborations with researchers elsewhere. Some senior researchers also pointed to specific invitations and visits as a result of their stays abroad, which they argued was an indicator of their improved esteem. One Danish researcher observes how some colleagues changed their attitude towards her after she returned from a stay at a prestigious foreign university, and claims that she was perceived as more competent than before and therefore became more appreciated and visible in her research environment.

A few respondents have seen their wages increase as a result of temporary visits abroad. One Norwegian researcher at the professor level tells how the head of her department stated that international mobility and evidence of further extended networks were a prerequisite for a salary increase. After being away the researcher found that her salary had been raised without having to ask for it. One researcher in the human sciences at the University of Iceland says that although mobility as such has not been rewarded, the university pays a fixed sum for each publication, which tends to increase in number after sabbaticals. In productive years, the researcher says, such bonuses may add up to 20 per cent or so of the wage.

Only one respondent concluded that the post-doc abroad was more negative than positive for the career:

A colleague who defended his thesis at the same time as I did stayed in Sweden and continued to work with his old supervisor. He therefore has more publications than I have; he looks more merited than I do. I had problems during my post-doc because it took me a long time to get the new project started.

A couple of other researchers make similar points, that mobility might render temporary dips in the publication records, which may be negative for young scholars in particular when they apply for funding. The respondent quoted above, however, added later in the interview that some colleagues who had stayed at the department recently had funding proposals rejected because of lack of independence from their senior colleagues or former supervisors.

3.3.3 Impacts on research environments and on researcher identities

Arguably the most fundamental reason to encourage research mobility is that mobile researchers gain inspiration and develop competencies that others benefit from as well. Some respondents who work at universities underline that aspect and specifically reflect on how their mobility has benefitted the research environments they work in. Such comments mostly came from early-stage researchers, probably because they had other expectations or were more ‘formable’ than the senior researchers. One former post-doc argues that he mostly learned new ways of organising work:

At [a prestigious university] they expected you to work hard and more efficiently than I was used to, they were more focused on results. They also thought more in terms of projects... They were good at picking ‘the right project’ at an early stage, to consider the balance between what it is important and what can be done within the given framework... I have brought such ways of organising work back to [my home university].

Another former post-doc notes the benefits of observing world-leading researchers in their everyday environments: the opportunity to gain insight into core aspects of academic work and supervising which can hardly be attained from a distance:

I have learned an incredible amount from working with the stars I have visited abroad. They have all had specific views on data and how to do research on [the phenomena that I study]. One of them in particular taught me a lot – it was about the whole attitude to research, how to think, how to work with young scholars; I got lots of inspiration... There is so much in a supervision situation, in that relation, that you cannot learn on your own; you have to learn it through mentorship. Then it’s great to be able to observe the very best, how they work.

Along the same lines, a third former post-doc noted that it is difficult to guide PhD students into the international academic scene unless one has extensive personal experience of international science:

I have some PhD students now. I wouldn’t be able to help them as much if I didn’t know how the international research community works. I can give them better guidance now.

In addition, several interviewees at different career levels told how during visits abroad they had observed routines and arrangements of undergraduate education, PhD education or research seminars that they had (tried to) introduce in their home departments.

Reflecting back on their international mobility experiences, a number of university researchers also concluded that their mobility has given them perspectives on themselves and their home research environments, which they find highly rewarding and stimulating. In the words of a senior professor from Norway who has spent a total of about five semesters as a visiting researcher abroad throughout his career:

You develop an outsider perspective on your country and your own research environment – what are we doing in this place? You are able to compare. That’s a healthy thing to do for all researchers.

The same respondent also argued that researchers should acquaint themselves with different cultures of working together, and specifically claimed that researchers in most leading research countries have a more direct tone towards each other than Norwegian researchers have, which young researchers need to learn how to handle.

Another university researcher states that the periods at foreign universities have entailed enriching exposures to local academic cultures and ways of organising the research. The researcher specifically mentions observations on how issues were discussed and the kinds of questions that were asked at seminars, etc., which has led the researcher to reflect on how things are done at the home university.

Several interviewees also tell about trips to leading universities where they have experienced how professional life spills over into the private sphere more than it does in the Nordic countries. For example, a couple respondents tell about parties and dinners in the homes of colleagues, which they find uncommon in their home countries.

4. Mobility and private life

While the previous two chapters focused almost entirely on professional activities, this chapter is intended to illuminate private aspects. Factors related to private life are often key determinants behind the choices and actions researchers make with regard to mobility. We observe three main sets of private factors that influence mobility choices, and deal with these in turn: Researchers' interests in having new or exciting personal experiences; their family situations; and rights, obligations and challenges related to social security, legal regulations, and administration that come with moving abroad.

Although the chapter is intended to cover both inter-sectorial mobility and international mobility of academic researchers, the empirical material in this study clearly indicates that factors in private life are most important with regard to international mobility. This chapter therefore mainly deal with this group of researchers. Arguably, in inter-sectorial mobility private life is most important with regard to having a stable income, which we deal with in section 3.1.

4.1 Personal experience

Motives for mobility are not always related to research as such. Sometimes the researcher's private interests are just as important. Many respondents, both among those with experience from international mobility and among inter-sectorial mobile researchers, express a desire to have enriching personal experiences. For instance, one respondent states that international mobility has been a healthy experience as "it forces you to grow very fast, both professionally and individually".

Some respondents say their interest in international mobility was sparked by chance as specific opportunities arose to go to a foreign country or to participate in an international research project. In some cases colleagues who had been mobile inspired them to take the step. Others express a need to get out of their everyday routine and do something different, to get a change of scenery (see also 2.3), both for change as such and to be exposed to challenges – in the words of a professor with plenty of experience of international mobility, "It's not good to be inside your comfort zone all the time". A professor who left academia for industry says his academic career goals were fulfilled and it was time to move on:

I was successful as a scientist, I have published more than 150 papers and I could have continued. But it was a challenge to do something different, take it to the next step. I am not normally a risk-taking person, but after a long time you have to just do it. My motto is: it has to be fun! That's why I did it.

Over the years many internationally mobile researchers have been abroad for longer stays several times and enjoy travelling; a few of them even consider mobility to be a lifestyle. One researcher says mobility is connected to who she is as a person and to her international friends and family. Respondents who cite these kinds of arguments typically do not ask why one should be mobile; rather, they find it strange that other researchers choose not to go.

For others mobility may not be a lifestyle but rather a rare opportunity for an exciting experience and something that will be a memory for life – there may not come around many chances to spend a longer period of time in a foreign country, more or less fully funded and with the possibility to return home to a new or to the same position. The stay abroad, motivated by scientific progress, may in reality be a bit of an adventure and a quite nice time – "Who would not like to stay in southern California if possible? I would, anyway!"

4.2 Family

4.2.1 Bringing the family abroad

Family is commonly cited as one of the most important factors influencing the decision to be internationally mobile, as well as the format of the stay. Family-related issues are typically mentioned as the main obstacle to going abroad, causing significant financial as well as practical challenges. However, despite various obstacles there is a general consensus amongst respondents that challenges are part of the experience and that most researchers are willing to deal with them. Yet, we suspect that if we had the opportunity to ask non-mobile researchers why they have chosen to stay, family matters would stand out as the number one reason they mention.

The period in life when people have children often coincides with the period when independent research careers take off and researchers have unusually good opportunities to be professionally mobile, typically as post-docs. This situation is particularly common in the Nordic countries, where PhD students usually are more than 30 years old when they graduate, while in many other countries they are in their 20s.⁷ Interviews indicate that the family situation is particularly challenging when there are young children involved. Once the children are grown, or before there is a family to speak of, there seems to be few problems. As one professor in her 50s who never married puts it: “no children, not married – no problem!”

The largest obstacle to bringing one’s family abroad concern extra costs. A majority of the internationally mobile respondents mention that going abroad can be very expensive in the short term, for instance with costs for double housing, odd taxation, loss of the spouse’s income, and sometimes also loss of child benefits.

The majority of respondents who brought their families abroad did not receive any additional funding for their families, such as extra funds for travelling and accommodation. Hence, it was crucial for them to have a large enough income to cover the entire family’s costs. The lack of extra funding was a particular problem when the researcher’s spouse came along but was not able to work, with the consequence that the family was forced to live on a single income. Relatedly, there were also significant obstacles in cases where the partner had a job from which it was difficult to take a break or a wage that was higher than the researcher’s. Since men’s wages tend to be slightly higher than women’s, this obstacle can also be a gender issue.

One cost that respondents describe as particularly challenging in case of lack of funding concerns child-care and schooling, especially in cases where researchers are single parents or where both parents have jobs at the host location. One post-doc solved the problem by bringing a relative, her husband’s niece, who took care of the children. Even if that solution was “very expensive” it was the family’s only option.

Despite efforts to attract funding, many researchers still had to fund parts of their stay out of their own pockets. This has particularly been the case for Icelandic researchers. The majority of respondents, from all countries, find extra costs worth paying to a certain extent, since international experiences bring so many benefits. One Icelandic professor argues that international mobility is an interest or investment just like anything else, which the researcher prioritises instead of buying a new car or a TV:

Travelling is expensive; I pay out of my own pocket a lot because I need to be active. It is a solitary task to be an academic in Iceland; it requires participating in the international scene.

There are also quite a few examples of respondents who have had full financial support for their families. A majority of these respondents claim that the generous support was crucial in order for them to bring their families, or to go at all. Respondents also describe additional scholarships and grants de-

⁷ The average age for completing a PhD in Finland was 38 in 2009 (European University Institute 2013), in Norway in 2011 it was 36 (Thune et al 2012), in Sweden the median age in 2012 was 34, as compared to an average age of 26-27 in the United Kingdom (European University Institute 2013). Data for Denmark and Iceland was not available.

signed specifically for bringing family members or for covering childcare costs. It seems that such grants are often unknown to researchers until they really start to engage in planning a trip – thus, because the grants are unknown, some researchers may abandon the idea of going abroad already before he or she has even begun to look for available support. One respondent who received extra family support from the Research Council of Norway says:

I didn't know about the grant in the beginning, but once I found out about it, it was easy. I wouldn't travel without my family, and it wouldn't have been possible without extra funds.

Besides financial costs, there are a number of practical barriers that need to be overcome in order to bring the family abroad. There is a general perception among respondents that having school-age children entails the largest problems, since a school abroad can be very expensive and difficult to locate, as well as inflict practical issues. One respondent says that the child was allowed to attend school in the host country only if the family stayed for one year; it was difficult to get admission for shorter periods. One professor explains that her family managed to find a solution to this problem by a compromise:

We have had home schooling during shorter stays; then my husband had to take care of the children and could not work.

Having school-age children can also be a problem at home, as all Nordic countries have some form of compulsory school attendance, which puts more pressure on the parents to ensure schooling in the host country. Respondents who went abroad while their children were young say that they are unsure whether they will be able to leave again because of compulsory school attendance. They agree that they are now left with fewer options; they either have to take the opportunity to be mobile while the children are small, wait until children are grown up, or make sure to stay abroad for a long enough period of time to enrol their children in a local school.

When bringing the family abroad, several respondents put a great deal of emphasis on the point that everyone in the family must be satisfied in order for the stay to be a success; if someone is not, the stay can be a rather terrible experience for the whole family. Even when funding and practical liabilities are taken care of, family members do not always want to move and the parents may worry about their children losing touch with friends or grandparents at home. There can also be challenges as children do not speak the language of the host country and are not as proficient in English as their parents. One Icelandic respondent with plenty of international experience says he would like to bring his family but has problems doing so:

My kids refuse to leave their school! It is no problem legally, but the kids are happy here and do not want to go abroad. But I cannot leave my wife with three kids for a month. That is too long.

One concern expressed is that the researcher's family members need to have something meaningful to do while abroad. If working is not a possibility, the spouse needs to find some other occupation. Respondents say their spouses have chosen to do volunteer work, study, work from home, etc. A few cite examples of host institutions that make efforts to welcome visiting researchers' families and make them part of the community, which they regard as positive experiences. Prestigious universities in the US are specifically pointed out as examples of good practice, although globally there seems to be great discrepancies between host institutions:

Socially it can be tough to take family with you, for one parent to stay at home while the other has a job and colleagues. That was a great advantage with [a prestigious university], they are good at taking care of family members; seminars, coffee, play dates for children.

4.2.2 Choosing between family or research

Despite encountering financial and practical challenges, the majority of our respondents argue that challenges are surmountable and worth the effort. Some of them, however, have not managed to combine family life and research. One respondent who has been on several international research stays in the past says he has now turned down invitations for international research positions because of the large costs of bringing the family and the practical liabilities it entails. Other respondents say they have made their stays shorter as the family could not join. For a Norwegian researcher, the barrier lies in the fact that she is divorced. She can no longer bring her child abroad because the child's father does not allow the child to be away for too long and therefore she has opted out on future international mobility.

Although most respondents try their best to bring their families, several respondents argue that it is better to leave the family at home when going abroad in order to avoid barriers. This is typically a more common choice when it comes to shorter stays, mobility to nearby countries where family members can easily visit, or when the researcher is in a relationship that does not include marriage or children.

There are also a couple of examples in the study in which respondents have broken up with their partners during a longer stay abroad, which might indicate that some find it challenging to maintain relationships at a distance. A small number of respondents also openly state, or indicate, that they chose a life of international mobility over the possibility of staying in a relationship and establishing a family. Two respondents who are or have been in relationships say that they are willing to sacrifice the relationship for the international experience. One post-doc who is approaching the age of 40 says she has never had a serious relationship as she has continuously chosen mobility over boyfriends. Relationships "currently don't matter" to her; what she finds most difficult is that she is far away from her nieces and aged grandparents.

When it comes to leaving family behind, Icelandic respondents often describe the situation as less of a barrier compared to other nationalities. Icelanders have a tradition of leaving the country for work or studies. One respondent explains that partly for that reason Icelanders have large networks of extended family that can take care of the children when one is away. A divorced Icelandic researcher says:

I have been away three times for three months and always left my children behind. They have a father and that's what fathers are for, otherwise you don't need them! It requires organisation and dedication but that is the reality for modern women.

Since the economic crisis it has become more expensive for Icelanders to travel because of an unfavourable currency exchange rate. It has therefore been particularly challenging for Icelandic researchers to bring their families abroad which, according to one respondent, has resulted in more researchers leaving their families at home.

4.2.3 Family as enabling factor

In some cases family can also function as a facilitating factor for mobility. For quite a few researchers, the spouse has been able to work at the host location, either by finding employment on location, working at a distance or by going on sabbatical leave at the same time if the spouse is also a researcher. In some cases, the respondents have decided to go abroad because the spouse had already been offered a position at the host institution. Others have chosen to go abroad largely because they have relatives living at the host location. One respondent explains that she was able to stay abroad for a longer period of time because she could combine her research leave with six months of maternity leave.

4.3 Practicalities

When it comes to practical challenges and opportunities, it is clear from interviews that these can appear in many shapes and forms. They include foreign cultures and new languages, bureaucracy in the home country as well as host country, and retaining social security.

4.3.1 Culture and language

Several respondents say they have been exposed to great cultural and language differences upon arriving at the host location, even at host locations that geographically are rather close to their home cities. However, culture and language are rarely, if ever, regarded as a barrier large enough to completely discourage them from engaging in mobility. Most respondents view it as something expected or even a desirable opportunity for new experiences and learning – cultural differences “makes for challenges but not problems”.

A few respondents were familiar with the host location before they planned their stay. Some have performed research in, and travelled to, that same country or place before, and some knew people at the host location who immediately made them feel at home.

Although not frequently mentioned by respondents, cultural differences have posed some problems. Notably, cultural and language barriers need not be greater the further one travels: one respondent who went to a Norwegian university says the working culture there was surprisingly different than expected, mainly because the researcher found that Norwegians did not work as many hours as expected; and a Finnish respondent who works in Sweden experienced issues getting used to unwritten social rules and understanding how Swedes communicate:

It has been more difficult to go to Sweden than to the US because of the language and culture. In the US, they are used to immigration, so it's very easy to go there if you have a job and education.

Respondents generally agree that being internationally mobile has provided them with new language skills, both for the researcher and accompanying family, but language has indeed been a problem for a few respondents. Language issues are typically mentioned by researchers who have been to non-English speaking countries or to other Scandinavian countries where you are often expected to understand the language. It is obvious that going to non-English speaking countries may be discouraging to some researchers; for instance, a post-doc said that he only considered English-speaking locations.

4.3.2 Social security

Many respondents emphasise access to social security as a crucial factor when deciding to go abroad. If the researchers are employed by their home organisation while being away, many key issues are easily solved: they do not have to arrange for pension plans and healthcare issues are relatively easy to handle. Some researchers have also been funded by programmes that cover social security costs.

The general view among the respondents is that being internationally mobile within the European Union implies no or only marginal issues of healthcare, since Nordic researchers can receive healthcare within the European Economic Area through the European Health Insurance Card. However, when travelling outside Europe, for example to the US or Asia, additional insurance is usually needed.

Several respondents say they had to pay for health insurance themselves or for additional insurance for family members, which can be very expensive. One professor who travelled with his family says that getting health insurance abroad was difficult because the family had a baby:

Healthcare was definitely an issue. You cannot have any pre-existing health problems, and apparently having a baby is considered a pre-existing condition. Luckily, [the host institution] has a good system similar to Europe. But we almost left the US before we realised this, since healthcare would have been too expensive otherwise.

One researcher was offered a three-year position in an African country and decided to go there with his wife. Two weeks before departure, they found out that his wife was pregnant so she decided not to join him because of the risks of malaria and insufficient healthcare: “I don’t care about diseases myself, but it’s hard when you have a family and children.”

Researchers whose mobility relies on funds and scholarships often experience a loss of pension funds and unemployment benefits when they leave their home countries. One researcher says that her pension funds are very low despite the fact that she is almost 40 years old, which she explains with a decade of temporary positions, of which several have been abroad. Another respondent says he has earned pension funds in one of the host countries he stayed in over the years, but he will not be able to use the funds anywhere else but in that particular country.

For some respondents, being outside the social security system has also caused problems with parental leave; they have not been able to draw on the comparably generous benefits of the Nordic countries. One respondent who is pregnant knows that she will not be able to stay at home for more than a few months and that because of regulations in the host country her husband cannot go on parental leave at all. Another respondent found it problematic to be kicked out of the Swedish social security system when he and his family left for a post-doc abroad:

My wife and I lost our unemployment benefits and pension benefits when we migrated, plus that we had no right to parental leave and my wife did not have an income. That was a huge problem... I was lucky to get a job as soon as I came back to Sweden as I would not have received any unemployment benefits.

Despite causing great concern, most respondents agree that social security barriers have generally not been large enough to discourage them from being mobile. One researcher, however, says that in the future he only wants to go abroad if he can stay in the social security system at home, since he is afraid of losing his security rights. Several respondents comment that it is important to be prepared for what is to come and that they have spent a lot of time before the trip checking out how things work. Many respondents also wished that more information was available at the time of preparing for mobility as that would have made it easier to tackle obstacles.

4.3.3 Administration

Living abroad has certainly resulted in an additional administrative burden for some respondents, e.g. in terms of fiscal regulations, obtaining a visa, finding a house or acquiring a car. Many respondents argue that challenges are mainly related to bringing family members abroad as it requires additional visas, making arrangements for childcare and school, etc. Unlike barriers related to social security, administrative challenges of various kinds also occur when going to countries within the European Union or even within the Nordic region. Some interviewees report getting help from the host institution in finding a place to stay. They almost always had to do other things on their own, such as getting a foreign personal security number and setting up a bank account. One respondent who left Sweden for another Nordic country concludes that administration is tiresome everywhere.

Respondents have varied experiences of dealing with foreign fiscal systems. Challenges relate to systems in the host as well as in the home country. Staying within the European Union seems to be of little help as researchers have struggled with complicated taxation rules regardless of location. According to interviews, going to the US seems to be particularly difficult in terms of filing taxes. One post-doc in the US says that he has felt compelled to consult a tax advisor for help. With regard to taxation, there seems to be differences between the Nordic countries with regard to thresholds of how long one can stay abroad before one has to pay taxes in the host location.

Some respondents have found it difficult to find a place to stay in the US since foreigners lack an American credit rating. Individuals with no credit rating are placed at the back of the line when looking for an apartment. This is particularly challenging for researchers who do not have a permanent position anywhere, and therefore cannot show enough credible evidence of a stable income. One researcher who went to the US had problems renting a house and car because of this:

To rent a house, we had to hire an American real estate agent who worked on commission for the landlord. To do it on our own turned out to be impossible. Once we found the agent things went pretty smoothly. In the same way we could not lease a car as planned; we had to buy a car with cash with direct transfer of the whole sum.

Several respondents have experienced difficulties with visa regulations, again, especially in the US. Obtaining a visa as such seems not to have been a problem; the problems have been connected to regulations that come with the visa. For other respondents, visa issues have mainly been related to obtaining visas for family members. For instance, some countries differentiate between married couples and couples who are not. One respondent says that she was just offered a position abroad and will be able to bring her children, but that her husband has not automatically been granted a visa to join her:

It's stressful and it's not clear yet how it's going to work out. I hope he can get a job that can sponsor his visa.

There is a general view among the respondents that the main barrier with administration and bureaucracy is the amount of time that is required to solve practical issues, time that arguably could be much better spent:

I need more help with all the surrounding implications of going abroad. I used so many hours on administrative stuff, finding my way around in the systems, instead of doing what I am good at: research.

There is more administration involved when researchers bring their families; several respondents argue that planning for international mobility may take several years.

5. Support for temporary mobility

More or less every researcher who leaves a permanent position for a temporary stay elsewhere – in another country or in another sector – needs some sort of economic support. All of them also need their managers to accept their stay. This chapter concerns support for temporary mobility. The first section discusses aspects that relate to external funding. In the second section we consider support from universities for temporary international mobility, where we observe that the department level is particularly important. We also observe that Iceland and Denmark are special cases among the Nordic countries, albeit in quite different ways. The third, final section concerns support for temporary inter-sectorial mobility, both from universities and companies.

5.1 External funding for temporary mobility

Funding to be mobile is mainly an issue for internationally mobile university researchers. Only very few funding programmes in the Nordic countries fund inter-sectorial mobility of three months or longer; consequently, only a couple respondents in the inter-sectorial mobility category have relied on external funding. In almost all cases temporary inter-sectorial mobility as primarily adjunct professors has been funded by either the company or the university. In the cases where an inter-sectorial mobile researcher has been funded by an external actor, the funding has been accompanied by support from the company and university, both of which have endorsed the researchers' applications and made the application procedure relatively smooth.

A majority of the temporarily mobile researchers who have stayed abroad have been highly dependent on funding programmes. Four types of funding dominate, occasionally in combination with each other:

1. Support from the home institution, such as a university-funded sabbatical, which in Norway typically includes extra funding for additional costs;
2. External funding from a research project;
4. External funding from a programme specifically focused on research mobility, such as programmes for international post-docs, sabbaticals or exchanges;
5. Funding from the host institution, such as scholarships or temporary positions.

For those who had their stay financed by the host or home organisation, funding has generally met the researcher's needs.

Those who relied on grants and scholarships, however, occasionally encountered problems. The most common obstacle is related to the uncertainty of the funding. Several respondents argue that much of the planning for international mobility can only be undertaken when funding is secured and an invitation is in place.

This sometimes clashes with regulations at the funding programmes, in particular if these require that the funding is used within a certain period of time. Plans may have to change because of wishes from the host institution, challenges in finding a school, the job of the partner, a pregnancy, problems finding teacher replacements in the home department, etc.. Applying for funding can be particularly challenging for young researchers who are inexperienced with application procedures.

Grants for international mobility vary in scope, from fully covering all expenses, including family, to only covering costs for travel and accommodation for the researcher. Some respondents have had problems covering all costs, and therefore they have applied for additional funding for e.g. costs related to

family or housing, or they have sublet their house at home in order to cover costs. Finding additional funding has been particularly crucial when family came along and the spouse did not have an income.

Some respondents had to combine different grants in order to meet their needs, piecing the grants together and taking the different requirements into account. Such work required much effort and planning. The experience of a Swedish researcher says a lot about the challenges a funder can pose:

I could keep my wage from the university, from the research project I had. I applied to stay for a year. I received SEK 80,000 from the funder. How was I supposed to bring my family? We have three children and my husband was also invited to the same university. It seemed like the funder did not want me to bring my family after all. Or perhaps it only wanted me to go for two months, but that would have been a completely different kind of trip; you wouldn't have been able to integrate into the new environment! In the end I managed to secure funding from three different sources, without which I wouldn't have been able to go... I also found out that some funders do not consider how many children you have, only that you have children; they only have a lump sum for family support.

One post-doc says that he would have liked to stay longer at the host location, but that he had difficulties bringing his family members as the grant could only be used for research and not for travel and accommodation. Another respondent from Norway who frequently goes abroad has had to shorten her stays because she pays out of her own pocket, while also considering her family:

In the last few years my trips have become shorter because it's too expensive. I cannot use my own money for funding in the long run. It's hard to apply for funding for shorter trips, but on the other hand I don't want to be away from my daughter for too long.

However, in principle most respondents find it unproblematic that funders make them compromise their intended stays, as long as the rules are clear in the application process:

There are things the funders may require you to do, for example that you have to be away for a certain period of time, but you know that when you apply. You are not forced. So it's not negative or limiting.

Another barrier related to grants is the poor visibility of grant opportunities. Also, in cases where the home university has information about funding opportunities, researchers do not always know that this information is available.

5.2 University support for temporary international mobility

5.2.1 Local leadership and ‘mobility cultures’

The interviews with researchers indicate that the management and leadership of the local university research environments – departments and research groups – are important for international mobility; a result in line with the assertions made by officials at the mobility funding agencies. A significant number of respondents identify this as a level where management really can make a difference. Two Danish interviewees state explicitly how the local university management has enabled a culture of mobility to develop.

Several interviewees remark that the interests of central university managements and department managements often differ significantly; even if the managements centrally and at the faculty level manifestly support international mobility, the department level can be a bottleneck. Several researchers, especially in mid-career but also full professors, observe that it can be difficult to ‘buy oneself out’ of teaching.

And to the contrary, having to leave teaching also means that one loses influence and perhaps cannot come back to teach the courses one used to teach. As one researcher observes, this has mixed consequences:

Both times [that I have been away] there have been changes in my coursework. That is good and bad – bad because I started to care for the subject and had to get into new subjects, good because there is a risk of stagnation if one always teaches the same course.

It seems common that university researchers have to find teachers on their own who can replace them and teach their courses and supervise while they are away. This can be an arduous task if no one else in the local environment has the same competence profile. Researchers who supervise single undergraduate students or PhD students can have particular problems finding someone to take over those tasks:

Department leadership does nothing, everything is up to us. We supervise via e-mail. It is such a waste to sit [abroad] and spend time on such things, the precious time could be used in other ways.

After having made a similar point, another researcher adds that the distance is particularly problematic when things at home do not develop as planned:

You can supervise from [abroad], but not if something unexpected happens. Then you are dependent on colleagues at home who can help you.

Yet another respondent argues along the same line, but takes on the perspective of the department leadership, which must balance a lack of resources with the need to ensure that teaching and administrative tasks will not suffer when somebody leaves. This researcher sees a system failure rather than a problem restricted to the department level.

When you get funding for mobility, the full cost must be covered – there has to be a more long-term perspective, the department must be able to cover its needs. Employment processes must be simpler and much quicker, especially for post-docs or temporary lecturers. It’s easy for the Rector to say that the university must be better at international mobility, but there has to be a system for it. I just don’t want to leave my colleagues with an extra burden.

For career reasons or to retain status in the home environment, researchers feel pressured to agree to do things at home while they are away, even if they do not need to. This could apply in particular to early-career researchers.

I led a project [that was not primarily about research] and wrote an application to ensure its future funding, and I reviewed the manuscript of a PhD dissertation at my home department. These things took too much time, and I am pretty sure I didn't have to agree to do any of it.

Overall, the interviews indicate that the promotion of international mobility to enhance the quality of research is an issue discussed in many places, which might indicate slow changes towards more positive attitudes to mobility. One respondent argues that international competition has contributed to a change of culture in the research environment:

Mobility is a deeply rooted tradition in my department: All PhD students should go abroad for at least two months. The department pays for that. The senior staff, however, is much less mobile, but things start to change. [My department] has long seen itself as number one in Scandinavia, been content with that and very introverted. There is a different attitude among mid-career scholars now, among those coming up. People are even ready to leave for permanent positions abroad. The department has had to react, and has understood that mobility is good for everyone.

In other places the situation is different. One respondent notes that despite staying for one year at a famous institute at a relatively prestigious university abroad, the reception at the home department was very modest:

Nobody at the department seems to appreciate my stay abroad. Nobody has been curious; nobody has asked whom I have met. In terms of merits my mobility was good for my CV but apart from that it was not... The biggest risk of being away was that I would be forgotten.

However, the question of department leadership for mobility must not be overstated; in the individualised academic world, international mobility is generally not very dependent on cultures or organisations that promote it. In the empirical material there are several examples of highly mobile researchers who depict their research environments as relatively uninterested in international travelling. Moreover, for young researchers it is often enough with one influential senior supporter:

There is not much mobility in my field, not really a culture of going abroad. But my professor knew that I wanted to go [on a post-doc], he gave me lots of support.

Quite a few internationally mobile university researchers interviewed for this study claim to be working to get their colleagues – especially PhD students – interested in going abroad for a longer period of time, which indicates that international mobility might be somewhat self-propelling.

5.2.2 Sabbaticals

A specific indicator of university support for international mobility is the extent to which universities fund sabbatical semesters. In the Nordic countries, such sabbaticals exist almost exclusively in Iceland (see 5.2.3) and Norway. In Denmark and Finland universities only very rarely fund sabbaticals. In Sweden all professors used to have the right to sabbatical semesters, but the government removed that regulation in 1999. Since then only very few researchers are funded – for example, Stockholm University, one of Sweden’s largest universities, currently funds sabbatical semesters for three to four researchers per semester.

Norwegian sabbatical schemes are regulated at the university level and administrated by the faculties. Most universities and many university colleges have such schemes for their permanently employed research staff, which typically means one year of sabbatical per six or seven years. At the University of Bergen all permanently employed researchers get a one-year sabbatical every five years, although this is normally granted after an application procedure. For example, a professor at the Norwegian University of Science and Technology (NTNU) explains that researchers at NTNU who have not had sabbaticals in a long time and researchers who are able to co-fund potential stays abroad have a better chance of getting approval. Besides keeping their wage, researchers at most faculties at NTNU also get NOK 10 000 or so extra per month to cover additional costs, sometimes more if they have families, in case they want to spend their sabbatical abroad.

Similarly, for a long time the University of Tromsø has had comparably generous support for international exchange. All permanently employed research staff can apply for funding for international stays every fourth year, and every fifth year they can take a sabbatical. If they intend to spend their sabbaticals abroad and do not receive mobility funding from national funders, they are prioritised for additional faculty funding. The researchers interviewed in our sample at the University of Tromsø are very happy with the university’s culture and leadership regarding international mobility, something that one of them attributes to Tromsø’s rather long distance from other universities, which is negative for networking.

NIFU’s report shows that around 67 per cent of the Norwegian researchers have been on research visits abroad during their career, compared with 50 per cent of the researchers in Sweden. However, Swedish researchers have higher rates of international mobility than their Norwegian colleagues when it comes to foreign employers – around 71 per cent compared to about 56 per cent for Norway. Moreover, NIFU show that Norway has a much higher rate of mobility among senior researchers than among more junior researchers, while Iceland and Sweden have more even distributions. All these differences may indicate an impact of the Norwegian sabbatical schemes.

5.2.3 Special case 1: Iceland

Iceland stands out as the country where a culture of international research mobility is most manifest. All university respondents in Iceland consider international mobility natural and present it as an institutionalised part of ordinary academic life. This is also reflected in NIFU’s report, which shows that researchers in Iceland at all career levels have more experience with international mobility than their colleagues in Norway and Sweden. One factor that undoubtedly contributes strongly to the situation is that almost all PhDs in Iceland have taken their PhD degree abroad; doctoral programmes have only existed on a larger scale in Icelandic universities for about 10 years.⁸ Almost all Icelandic researchers therefore have extensive experience with spending time abroad. As one respondent in Iceland puts it:

In Europe or the US, I have sometimes been surprised to see that you can study at the same university and then continue there as an employee all your career. People have never gone anywhere! In Iceland we call that ‘home grown tomatoes’, we find that very strange. Since we have so few graduate studies, everyone goes abroad and comes back with lively international networks. For us that’s normal.

⁸
Gudmundsson, Hans Kristian (2008). Nordic countries. In Maresi Nerad and Mimi Heggelund (eds.) *Toward a Global PhD? Forces & Forms in Doctoral Education Worldwide*. Seattle: University of Washington Press.

Another reason for the positive attitude in Iceland is surely found in the geographical circumstances: Iceland's small size enables the country to fund only one major university, and the island is located quite far from other countries. Efforts to stimulate international research exchange thus become vital.

One outcome is the generous sabbatical terms: All researchers at the University of Iceland who are employed with at least five-year contracts are granted six months of sabbaticals every 3.5 years, paid by the university as part of the ordinary wage. The tradition is well established and all researchers have complete independence from university management in that respect. Unless the researchers are tied to their homes by e.g. having small children or parents to look after, they usually use their sabbatical to go abroad. The high status of the sabbaticals is further reflected in the priorities made in response to heavy cuts in university resources in the wake of the economic crisis that hit Iceland in 2008: the University of Iceland increased the teaching hours considerably but did not change the funding for sabbaticals. The depreciation of the Icelandic currency nevertheless left the researchers with less funding for foreign trips. There seems to be poor opportunities for Icelandic researchers to attain funding that cover extra costs, etc.

5.2.4 Special case 2: Denmark

In Denmark, the government and some university managements have introduced some formal requirements related to international research mobility. Such requirements have affected PhD education in particular: since 2008 the Danish government has stipulated that all PhD students must "participate in active research environments, including stays in other, primarily foreign, research institutions".⁹ In some Danish research environments, the formulation has been interpreted to mean that PhD students must spend one semester at a foreign university as part of their three-year education. In addition, international mobility is sometimes a requirement for permanent positions in Danish universities. Almost all interviewed university researchers in Denmark found the level of international mobility in their research environments to be high.

5.2.5 Formal partnerships

In recent years universities as well as governments in the Nordic countries have increased their efforts to establish formal partnerships with (in particular) prestigious universities abroad. An important part of these partnerships is to ensure the potential to stay at these foreign universities for longer periods of time. This type of partnership is new, and implies a different position for the researchers – on the one hand the entrance to some places and networks may become easier, but on the other hand it might entail a format for the stay that is not what the researcher preferred, or less independence in choosing where to go.

Denmark stands out as a special case in this respect as well, with foreign entities in countries of strategic relevance to Denmark. Denmark has established six Innovation Centres in Silicon Valley, Shanghai, Munich, New Delhi-Bangalore, São Paulo and Seoul, with one of their aims to facilitate links between Danish researchers and researchers at prestigious research institutions at these locations. In Silicon Valley this has resulted in partnerships with one research environment at the University of California, Berkeley and one at Stanford University. The partnerships include visiting researcher positions. Similarly, the Sino-Danish Center for Education and Research in Beijing is a partnership between the Danish Ministry of Science, Technology & Innovation and eight Danish universities on the one hand and the University of Chinese Academy of Sciences on the other.

One respondent in Denmark specifically comments on these agreements, arguing that they are attractive channels into high quality research environments as well as good support with practicalities connected to the exchanges, but they also entail potentially problematic top-down governance of researchers' links and interests, especially since the quality and attraction of a specific university can vary significantly depending on the given research field. The researcher concludes that the agreements are mainly negative.

⁹ Danish Ministry of Science, Innovation and Higher Education (2008). Bekendtgørelse om ph.d.-uddannelsen ved universiteterne (ph.d.-bekendtgørelsen), made public 2008-01-22.

Norway has a longstanding agreement with the US stating that researchers who go to the US for temporary research visits do not have to pay tax. Almost all interviewed Norwegian researchers who have taken sabbaticals in the US commented on this agreement, typically adding that it is very attractive. One Norwegian scholar, however, claims that visits to the US from a professional perspective are rather pointless for most Norwegian researchers in her field, but that quite a few of them go there nevertheless, which she suspects depends mainly on private economic considerations.

Of course there are also bilateral exchange agreements between university departments. Interviewees that have commented on this think that the initiatives for such agreements should come from the central university management, and they recommend that the university management requires all departments to establish ideally 10 exchange agreements. If the agreements were established by central university managements or others, there would be a risk of mismatch for some research environments.

5.3 University and company support to temporary inter-sectorial mobility

University and company support for temporary inter-sectorial mobility primarily concerns support for adjunct researchers, usually at the professor level. This section presents the extent to which adjunct researchers are used in the Nordic countries. To better understand the function of adjunct researchers, see section 3.2.1, which takes a broader look at the interests that companies and universities have in staff mobility.

In all Nordic countries there is adjunct scientific staff. In Sweden there were 1,020 adjunct staff members in 2012, who on average spent 26 per cent of their time at universities. A little less than half of the adjunct staff were professors. It is not known how many of these conduct research; however, 59 per cent of the adjunct staff were in medicine, primarily engaged in teaching.¹⁰ It is reasonable to assume that a significant majority of the adjunct staff who engage in research are at the professor level. Adjunct researchers can be employed for up to 12 years, but usually have three-year contracts that can be renewed once for another three years. The standard arrangement for an adjunct professor in Sweden is to spend 20 per cent of a full-time position at the university. In almost all cases adjunct professors are paid by the organisation (typically companies or – in medicine – county councils) they work for.

In Norway adjunct professorship – called Professor II – has a longer tradition than in the other Nordic countries. Professor IIs typically have contracts of five years, paid by the universities. There is no upper limit on how many times the contracts can be renewed. A Professor II can work up to 20 per cent for the university. Notably, they can combine the position with full-time work elsewhere, which is common and thus often adds up to 120 per cent employment. Norwegian Professor IIs are usually employed for teaching and paid by the university. In 2011 there were 1,342 Professor IIs registered, of whom 158 had their ordinary employment in industry. Also in Norway this type of employment is most commonly used in medicine, approximately 25-35 per cent, but it is much more spread across other disciplines than is the case in Sweden, which is also indicated by the comparably large number of adjunct professors. It is also possible to have equivalent positions at lower academic levels, such as Associate Professor II.¹¹ A couple of Professor IIs have been interviewed for this study. They all had teaching as their main task – research came only second and was driven by themselves and their companies rather than by the university. The report by NIFU shows that Norway, in a comparison with 11 European countries, has by far the highest rate of academic staff who have been employed in other sectors as well. The Professor II scheme is likely to contribute to this.

In Denmark adjunct scientific staff are only found at the professor level. The holders may either conduct research or teach. Occasionally adjunct professorships in Denmark are also awarded as “honorary titles” to individuals who collaborate with the university researcher environments and who have the competence of a professor. In Iceland adjunct scientific staff are found at both the lecturer and professor levels.

10 Statistics Sweden (2013). Personal vid universitet och högskolor 2012. Statistiska meddelanden UF 23 SM 1301.

11 Research Council Norway (2013). Excerpt from database, provided by Hans M. Borchgrevink.

In Finland adjunct scientific staff from industry is less common. Finnish universities have the right to award the title of adjunct professor (*dosentti*) to individuals who have the competence of a professor.¹² Industry researchers can apply to become adjunct professors which give them, for example, the right to supervise thesis work and to have a formal affiliation with a university. However, most adjunct professors are university researchers. Because professor titles in Finland are tied to specific employment positions it is common for other university researchers to apply for adjunct professorships to indicate their capacity and thus make the application procedure to professor positions easier, and to be eligible to compete for funding that requires the competence of a professor. Since 2010 an adjunct professor in Finland does not have to have an employment relationship with a university, which has made it easier for industry staff to apply for the title.

¹² Finlex (2011). Universities act 558/2009, Finland. Ministry of Justice, Finland.

6. Concluding remarks and reflections

In this final chapter we conclude the report by making observations in the first two sections about the most important drivers of, motivations for and barriers to research mobility. In contrast to the relatively high level of detail and descriptions of situations of individual researchers in the previous three chapters, we decided to keep these two sections short and succinct to make the conclusions clear. We finish the report by reflecting on points of specific significance and by identifying what we find to be the major implications for policy.

6.1 Major drivers and motivations

Temporary mobility:

- Personal capacity building through meeting new people, which also includes network building. Meeting in person for a long period of time is the most effective way to deepen discussions and lay a solid foundation for collaborations. For early-career researchers it is especially important to establish personal networks.
- Gain inspiration from contact with new colleagues, observe others' research activity and ways of working, etc. Temporary exchange can be an attractive alternative to a permanent change of employer, especially for university researchers.
- For university researchers: Get more time and 'latitude for action' to focus on research and thus be more productive – in their home research environments it is common to get interrupted by other, more pressing teaching and administrative tasks. This seems particularly important to mid-career and senior researchers.
- For industry researchers: Get the opportunity to conduct and publish empirical research. However, researchers still tend to be significantly restricted from doing this; publishing is typically of limited interest to a company, which prioritises other results from the researcher's mobility.
- Strategic reasons, such as conducting stays at (prestigious) universities to enhance their CVs, demonstrating their ambition, or showing that they can handle collaborations between companies and universities. All these are normally of less importance to more senior researchers, especially at universities. Companies are often interested in recruiting staff, shaping university research agendas, and gaining better access to research output. Universities are usually interested in inter-sectorial mobility as a way to develop better contacts with companies and improve their education at all levels.

Permanent mobility within academia:

- Better platforms for research careers, especially with regard to contract length, time for research and quality of research environment. For early and mid-career scholars independence from senior researchers can be an important reason to move.
- Show their ambition as a researcher, both that their professional career is important and that they are interested in developing new networks, etc.
- For universities, mobility is a strategic tool to ensure the inflow of new ideas for research and work methods, as well as to establish broader networks and increase international visibility.

Permanent inter-sectorial mobility:

- From university to industry: Stable employment, higher wages and better working conditions.
- From industry to university: Employment as a researcher and, probably, independence in research (the empirical material was very limited on this type of mobility).

6.2 Main barriers

Temporary and permanent mobility for university researchers to other universities:

- Family situation, which to some researchers, especially in Denmark, Iceland and Finland, also includes lack of funding to bring family members on temporary trips.
- Lack of funding to cover the extra cost of being temporarily mobile, such as travel and housing.
- Lack of funding to 'buy oneself out of teaching' for temporary mobility, especially in Denmark, Sweden and Finland where university-funded sabbaticals are very uncommon.

Permanent mobility from universities to companies:

- Lack of independence.
- Lack of opportunities to conduct research that can be published scientifically.
- Lack of opportunities to return to the university.

Temporary mobility from companies to universities:

- Lack of independence from the company, whose interest in the researcher's mobility is different from the individual researcher's own interest.
- Lack of opportunities to engage in empirical research; companies typically do not want their employees to spend more than one day per week at the university.

Permanent mobility from companies to universities:

- Lack of permanent positions.
- Lower wages, especially in engineering-related disciplines.
- Rigid requirements to have a scientific publication track record.

6.3 Reflections

6.3.1 Why encourage research mobility?

Research mobility increases the chance for knowledge transfer back and forth between a university and the rest of society, as well as between different universities. It also brings opportunities for knowledge creation through e.g. new impulses, networks, and the chance to conduct specific empirical studies. Research mobility paves the way for more efficient collaborations between universities and companies, which also includes more harmonised agendas for research and development.

The basic point about research mobility is that mobile individuals ‘intellectually de-couple’ from the professional contexts they are used to, and in that way open themselves up for new perspectives. They also enter the new environment with a perspective that differs from common practice in that place, which can stimulate fruitful discussions and creativity. When researchers meet in person they are able to screen each other’s competencies and ‘tune in’ to each other, which makes collaborations run smoother and knowledge transfer more efficient.

Research mobility entails more than meetings between individuals; it also concerns ‘meetings’ between individuals and material contexts, which pave the way for creativity as well. The material aspect is particularly evident in staff exchange between companies and universities, where universities usually attract companies with specific advanced equipment, while companies typically can offer environments for more large-scale testing and extensive data on ‘real things’.

It is also important to keep in mind that knowing is a practice. If knowledge is not put to use, or if the researcher does not get in touch with research environments and the ongoing scientific discussion, the researcher will inevitably lose competence. This is an important reason to encourage inter-sectorial mobility. Industry researchers generally find it difficult to stay updated and maintain the skills they developed during their PhD studies or their previous employment as a university researcher. Similarly, support for temporary research mobility can also help to avoid stagnation and lock-in of research environments at universities.

6.3.2 Sabbaticals: International mobility is prioritised

Sabbatical funding is a sign that international research mobility is prioritised. In the Nordic countries, sabbaticals exist almost exclusively in Iceland and Norway. The University of Iceland stands out as an exemplary case in this respect: despite heavy budget cuts in the wake of the economic crisis in 2008 the university did not change its framework for sabbaticals. All researchers at the University of Iceland who are employed with at least five-year contracts are granted six months of sabbaticals every 3.5 years, which is commonly used for international stays. In Norway most universities and many university colleges have sabbatical schemes for their permanently employed research staff, which usually means one year of sabbatical every five to seven years. Unlike researchers in Iceland, Norwegian researchers also seem to have relatively good opportunities to get funding for additional costs during sabbaticals.

6.3.3 University departments can be bottlenecks

The interests of central university management and department management often differ. Even if the central and faculty management support temporary international mobility, the department management might be against a researcher leaving for a longer period of time, since gaps in the teacher schedule may arise. It also seems common that university researchers must find colleagues on their own who can teach their courses while they are away. However, the question of department leadership should probably not be overstated; in our understanding it is often enough for a researcher to have one influential supporter in the department to be able to go abroad as planned.

6.3.4 Growth in partnership structures for mobility

In recent years formal partnerships to stimulate research mobility have become increasingly common. Such partnerships include e.g. formal agreements between (networks of) universities to keep a number of visiting research positions open for exchanges, Nordic research funders that fund visiting research positions in specific universities abroad, and universities and large firms that sign partnership agreements with each other. Denmark has also established six Innovation Centres in places of strategic importance such as Silicon Valley and São Paolo, and a Sino-Danish research centre in Beijing.

Formal partnerships make it easier for researchers from the universities and countries in question to conduct stays at attractive research environments abroad. However, at the same time there is a risk that the flexibility and matching in the R&D system will be negatively affected: the environments ‘on offer’ may not be the most ideal partners and it may become more difficult to visit foreign research environments elsewhere.

6.3.5 Growing demand for temporary research mobility?

University researchers who have been on temporary visits abroad commonly cite opportunities for increased research productivity as a major motive behind the stay. The increased productivity is not only a quantitative matter of researchers having the days free for research. It is also a matter of *quality time*: the researchers are able to focus and plan their time better when they are not disturbed by students, colleagues, teaching duties, etc. Temporary stays abroad may therefore be referred to as ‘pockets of productivity’.

With increased pressure on the sector for higher education and research to show results, it seems possible that a growing number of researchers, not least staff in teaching intensive environments in e.g. university colleges, will look for chances to get uninterrupted time for research during stays of a few months abroad. If this development occurs, it will also put pressure on university department leaders to come up with solutions when teaching staff go for temporary leaves.

In addition, funding for temporary research mobility – both international and inter-sectorial mobility – may also help some university researchers out of a problematic situation: Unlike almost all other professional groups, university researchers often only have one local employer to choose from. Thus, when university researchers are tired of their everyday environment and look for a chance to ‘recharge their batteries’, temporary mobility might seem attractive. The researchers need not (permanently) move with their families, and they need not make the tough decision of leaving a university for a company; for most permanently employed university researchers the latter would be a move that is more or less irreversible.

6.3.6 Social security and administrative challenges are generally of less importance

Despite causing great concern, most respondents agree that barriers related to social security have not been large enough to discourage them from being mobile. Yet it is obvious from the material in this study that research mobility can have profound effects on the individual researchers’ standing in the social security systems in their respective Nordic countries. These systems are in various ways not designed to meet the needs that arise during longer research stays abroad, and although the researchers have ways to address and fund most situations, inattentiveness to issues such as health insurance limitations can cause great problems.

Several respondents have experienced significant challenges because they lacked an American credit rating. Without this rating they found it very complicated to buy cars and rent apartments. Nordic research organisations that fund the stays may assist in such situations by providing letters adapted for the countries in question which clearly state the economic support being provided to the researcher (which several funding organisations already do).

6.3.7 Research mobility should be viewed in context

Above all, this study shows the importance of putting research mobility in a context. One aspect is that the event of mobility is typically *a means to another end*. For the individual researcher, the purpose of temporary mobility is often to establish networks or idea platforms that he or she can draw on for a long time. For the university, research mobility is a way to stimulate the creative potential of its research milieu. For companies, inter-sectorial mobility is but one aspect of university collaborations, which in turn may comprise opportunities to recruit staff, test new ideas for R&D in student theses, offer the potential to shape university research agendas, or simply to gain better access to useful results.

Another aspect of the importance of contextualising research mobility concerns the remarkable *variety of motives and barriers* that the respondents cite. We have shown that individual researchers often have different motivations for engaging in mobility, depending on their career stage, family situation, employment position, research interests and the like. We have also highlighted how the interests and strategies of companies, universities and research funders shape the opportunities that researchers have and thus also the choices they make.

6.4 Policy implications

The findings and reflections above have some policy implications. We refrain from proposing concrete action points, but we do present some thoughts or observations which deserve serious further consideration from NordForsk, other funding organisations, universities and R&D-active companies, and any other mobility stakeholders throughout the scientific system in the Nordic countries.

6.4.1 Mobility in a wider context

A most fundamental conclusion drawn from the findings of this study is the need to consider the full context in which research mobility takes place, as briefly summarised in 6.3.7.

- Design of instruments to stimulate research mobility must be based on a careful selection and formulation of visions, aims and goals for the specific effort. The funding organisation needs to ask itself what the purpose of the instrument is. Is the aim that universities and companies should harmonise their research agendas, or is it that companies should more efficiently absorb academic research results? Is the aim to support the development of top-class university research leaders or is it that university research environments in general should become more engaged with issues at the forefront of international research? One might of course also find other purposes. A careful selection and formulation of visions, aims and goals has implications for the choice of target groups as well as for the design of instruments such as selection criteria, requirements regarding financial support or letters of intent/commitments from university or company managers, etc.
- There is a need for flexibility when engaging in mobility; one-size-fits-all does not seem appropriate, at least not for larger programmes. If unpredicted external factors mean that a researcher's plans have to change, there must be a reasonable level of flexibility on the part of the organisations involved. The visit may suddenly need to be shorter or longer, there may be a reason to change host institution, or a new family member may arrive. Mobility funding organisations must be prepared to handle such upcoming deviations from the original plans – in a supportive and constructive manner. Such flexibility is also easier to handle if the organisation knows its own goals for the funding.
- The amount granted must be plausible in relation to the expected length and character of the stay. Funders must be willing to provide grants that cover the full costs. In some cases we have come across funders who had awarded researchers considerably smaller sums than the researchers asked for and needed, with the consequence that plans had to be changed or additional funding secured. With too little funding there is also a risk of unintended privileging of researchers who are single or have grown-up children. This kind of problem can be stressful and discouraging to the researcher and have serious negative impacts on the outcome of the mobility, contrary to the interests of both funder and recipient.

6.4.2 Possibilities for joint Nordic actions

We observe a marked heterogeneity across the Nordic countries with regard to funding opportunities for researcher mobility. For instance, the availability and format of funding for inter-sectorial mobility vary greatly. Examples of sophisticated programmes include Mobility for Growth by the Swedish Agency for Innovation Systems and several programmes by the Danish Council for Technology and Innovation. There are also differences between the five countries regarding formats of support for international mobility. The latter also includes differences between the roles that universities take to support international mobility. Most notably, university-funded sabbaticals – an admirable form of support – more or less only exist in Iceland and Norway.

- Is there need for a dialogue-platform where discussions between the main funders of research mobility in the Nordic countries can take place? The heterogeneity and various examples of good practice indicate a potential for fruitful exchange of ideas, practical solutions and coordination of activities. Given that such a need exists, can NordForsk take the initiative to launch and host such a platform?
- We observe the lack of a comprehensive, systematic mapping of initiatives in the Nordic countries to stimulate research mobility, often also at the country level. Many actors, including mobility funding organisations, universities, and governments, would probably make good use of such an investigation. In Appendix B we have included a non-comprehensive list of programmes for research mobility that we have come across. Where are the gaps and where are the overlaps between different funding schemes? Are the needs from the different types of actors in the national and Nordic research and innovation systems adequately met? Are there groups that have particular difficulties with getting funding?
- NordForsk may consider the need for a programme to which Nordic researchers can apply when they need extra support. Some researchers have described how they have been granted money that was not enough to pursue the planned mobility undertaking. Funds to cover additional costs are thus needed. In order to keep the workload down for researchers and speed up the funding decision – the latter of great importance if e.g. an invitation concerns a specific period of time – a tentative idea is that proposals to such a programme could be based largely on the same proposals that the researchers already submitted to the respective national funding organisations.

6.4.3 Actions to stimulate inter-sectorial mobility

Initiatives to stimulate temporary mobility between companies and universities generally seem to be rather small-scale and arguably not sufficient to satisfy the demand. On a general note:

- Quite a few respondents in industry call for better opportunities for temporary mobility between companies and universities, and argue that public co-funding of 50 per cent or so would significantly lower the barriers for such mobility to take place, in particular for smaller companies with more limited resources for R&D.

In particular we note the relative absence of two specific types of mobility support:

- Post-doc programmes for industry researchers. It is very difficult for PhDs to deepen or update their scientific competence once they have left their university for a permanent full-time position elsewhere, partly because they lack the publication record to compete with university researchers, partly because their companies are reluctant to grant them substantial time for research as e.g. adjunct professors. Programmes in which PhDs in industry get the chance to spend, say, 50 per cent of their time at a university during two to four years would probably be attractive to some and complement other programmes aimed to stimulate collaboration between academia and industry.
- Programmes for temporary mobility from universities to industry. Long-standing collaboration between a company and a university environment could be complemented by the equivalent of adjunct professors in industry: university researchers who spend part of their time on the premises of the companies. Some key questions would need to be resolved before such an instrument could be realised: How should academic merits be secured? How should it be ensured that one does not in practice fund consultants to the company?

6.4.4 Actions to stimulate international mobility

There are a number of support instruments in place for international mobility, but some gaps still remain. Certain groups have difficulties finding economic support, or deserve extra attention for other reasons.

- Short-term or semi short-term international mobility is attractive to many university researchers. We particularly think of visits abroad of around two to six months. Even shorter visits may be considered if relevant and of interest, but we do not mean week-long trips. The supply of such support far from satisfies the demand, especially not in Denmark, Finland and Sweden, where university-funded sabbaticals are rare. Also, some current initiatives are insufficiently designed, most notably in Denmark, Finland and Iceland, where there is a general lack of economic support to bring families along. There is a need to strengthen instruments in support of short-term mobility, but this will be different in each country.
- We observe that once a researcher has been mobile, he or she is normally prone to be mobile again. That insight calls for initiatives that stimulate early-career mobility, during the post-doctoral studies or shortly after. Denmark is an interesting example in this respect, where PhD students are often expected to go abroad for some period of time.

*A final reflection: When designing this study, we attempted to clearly distinguish between different categories of respondents – between researchers of different ages and in different career phases, and with different disciplinary backgrounds, and not least between researchers in academia and industry researchers. However, making such distinctions proved to be less meaningful than we expected. The variation of individual drivers of and barriers to mobility has been greater than expected. We have been able to make some generalisations, but we have also found that there are so many factors that shape the conditions for a single individual to be mobile that it is hard to identify clear patterns.

As a consequence, it is a significant challenge to understand how research mobility should be supported. It is simply difficult to be specific; it is difficult as a funding organisation to act in a clever way and design instruments which target certain groups or certain parts of the system in an optimal and fully efficient manner.

We believe that the solution is to accept that narrow and specific instruments tend to miss the goal too often, be inefficient and not in line with researchers' needs. Findings in this study indicate that researchers need support programmes with wide 'entrance gates' and considerable room for moving and manoeuvring once inside, according to the preconditions and needs of each individual. They need flexible support programmes, where each individual's unique situation is covered and allowed for. This in turn requires informed funding organisations, and flexibility in the management and the everyday handling of funding programmes. The stories that we have heard during the many hours of interviewing mobile Nordic researchers lead us to conclude that not all funding programmes are managed and handled in sufficiently informed ways. It is not always money that is missing; sometimes the responsible organisations or administrators lack adequate insights into the circumstances that mobile researchers face. In that respect we hope this study can make a contribution.

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List of mobility programmes in the Nordic countries

This is a non-comprehensive list of programmes in the Nordic countries that fund research mobility across sectors or internationally. Note that many of the programmes listed are not exclusively designed to promote research mobility. Note also that funding for research mobility also can be included in ordinary research projects, which for example is the case in projects funded by the Research Council of Norway.

Programmes primarily funded by the European Union as part of e.g. Marie Curie Actions, Joint Programming Initiatives and ERA-NET are not included. We also did not include small programmes aimed at exchanging a small number of researchers between two specified countries, e.g. the Research Council of Norway’s Aurora programme for exchanges between Norway and France. In all countries there are also Fulbright scholarships and a range of other private scholarships available. This type of support is only included in the list if it constitutes particularly important support in a country.

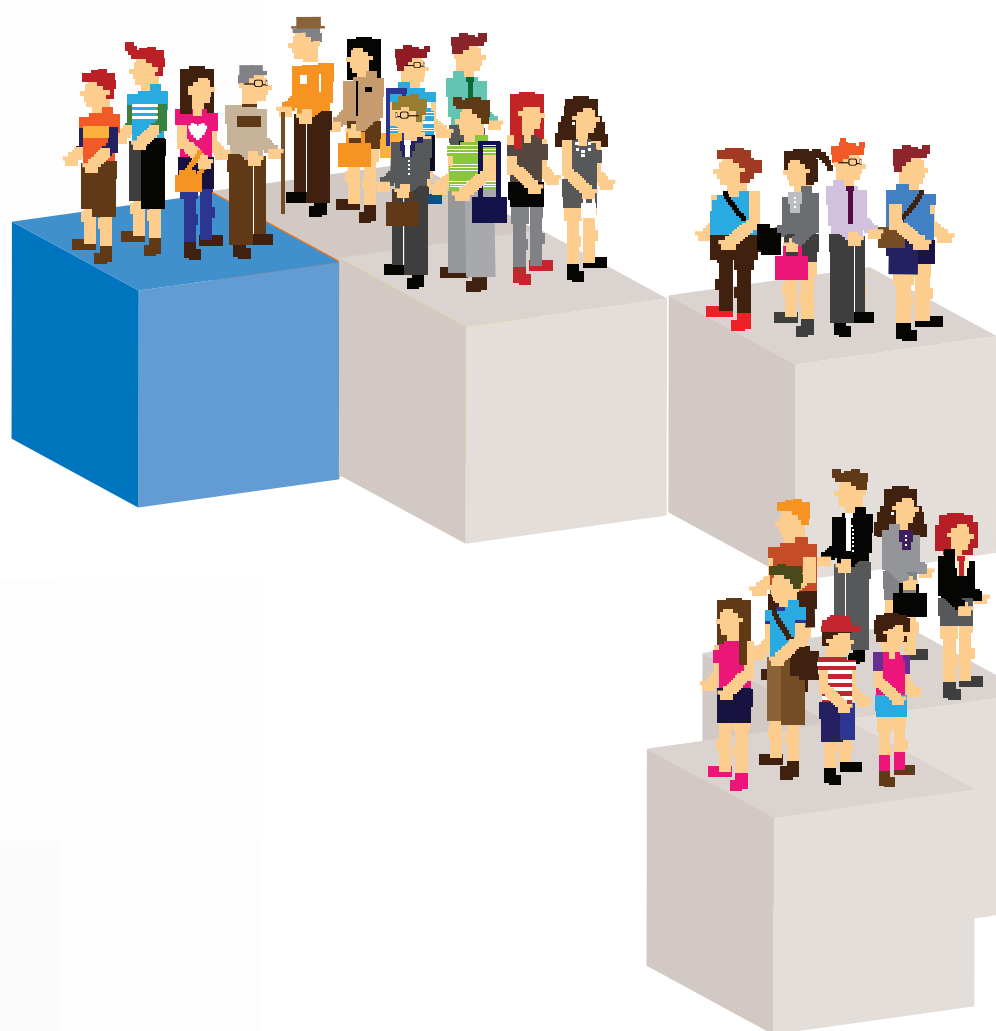
We compiled the list with input from NIFU.

Country	Programme	Budget	Funding agency	Time frame	Short description
Denmark	Sapere Aude	DKK 245 mill. awarded in 2012	Danish Council for Independent Research	2010–	Talent development programme for the elite. No requirements as to applicants’ citizenship, location of research institutions or specific venue for carrying out research. However, a general assessment criterion is the extent to which the project will benefit Danish research.
Denmark	EliteForsk-rejsestipendier	DKK 6 mill. (yearly)	Ministry for Science, Innovation and Higher Education	2006–	Framework for action that aims to find, strengthen and nurture some of the brightest and most talented researchers. The research prize is awarded to researchers under the age of 45 who are of international excellence.
Denmark	SPIR	DKK 64 mill.	Danish Council for Strategic Research	2013–	Funds initiatives which seek to strengthen links between strategic research and innovation and thereby promote efficient knowledge transfer and possibilities for fast application of new knowledge in connection with innovation in the private and public sectors.
Denmark	BONUS	DKK 30 mill.	Danish Council for Strategic Research	2012–	Aims to strengthen cooperation regarding research and innovation between countries in the Baltic sea region, within defined themes on the Baltic Sea and the Baltic Sea drainage basin and coastal zone. Its primary focus is on marine and coastline research.

Country	Programme	Budget	Funding agency	Time frame	Short description
Denmark	Innovation Consortia	DKK 230 mill. awarded in 2012	Danish Council for Technology and Innovation	2012–	Collaboration projects between companies, research institutions and advisory/knowledge transfer parties. Collaboration should be agreed on for a period of two and four years. Calls were issued in 2009, 2010 and 2012. The consortia may involve mobility of staff.
Denmark	Industrial PhD	DKK 10 mill. (for 2013)	Danish Council for Technology and Innovation	2002–	Three-year industrially focused PhD projects where the student is hired by a company and enrolled at a university at the same time. The company receives a monthly wage subsidy of DKK 14,500 while the university's expenses for supervision, etc. are covered.
Denmark	Innovation Assistant	DKK 52 mill. (for 2013)	Danish Council for Technology and Innovation	n/a	Provides funding for companies with 2–100 employees to hire an academic employee with an education at a master's degree level or higher to solve specific tasks. The company receives a monthly wage subsidy of up to DKK 12,500 for maximum 12 months.
Denmark	Innovation Network Denmark	22 centres, each receives DKK 10–20 mill. in govt. funding per 4 years	Danish Council for Technology and Innovation	n/a	Innovation Network Denmark has 22 nationwide innovation networks and three strategic platforms. An innovation network is a forum where companies and knowledge institutions share experience and develop new ideas within a specialist or technologically delimited field. Each network has pools for innovation projects where companies and researchers work together to solve concrete challenges. The innovation networks also carry out idea generation processes and matchmaking activities, and they hold theme meetings and specialist events.
Denmark	MOBILEX	n/a	Danish Council for Independent Research	n/a	Support the mobility and scientific development of researchers in the beginning of their research careers. Covers research projects of a duration of 24 months that will be carried out at research institutions within or outside Denmark.
Denmark	Industrial post-docs	20–25 grants per year	Danish National Advanced Technology Foundation	2011–	Collaboration between companies and public research institutions concerning the solving of specific research and development tasks. A post-doc conducts research for one to three years in a private company.

Country	Programme	Budget	Funding agency	Time frame	Short description
Finland	Academy research fellow	298 holders as of April 2013	Academy of Finland	n/a	Funds researchers' salaries for up to five years. The aim is to provide opportunities for talented researchers to develop their academic leadership skills and establish themselves as independent researchers. Fellows are encouraged to spend part of the period at institutions abroad.
Finland	Post-doctoral research fellow	127 awarded in 2013	Academy of Finland	n/a	Fellows are encouraged to engage in international mobility and collaboration as well as national, cross-sectoral mobility. The funding period is three years. Funding covers 36-months of salary, personal research costs and international and national mobility.
Finland	Academy Professors	41 holders as of April 2013	Academy of Finland	n/a	Funds professor's salary for up to five years. Aims to facilitate full-time scientific research for internationally leading-edge researchers. Holders are encouraged to spend part of the period at institutions abroad.
Finland	Serve	EUR 224 mill. (total budget)	Tekes	2006–2013	Aims to create new knowledge in service innovation and encourage the development of innovative and internationally competitive service concepts in companies by challenging traditional ways of doing things at both the strategic and operational levels. Encourages cooperation e.g. through researcher mobility between universities and industry.
Finland	SHOKs	EUR 40-60 mill. (annually for each centre)	Tekes, Academy of Finland	2006–	Public-private partnerships for speeding up innovation processes. The main goal is to thoroughly renew industry clusters and to create radical innovations. Encourages cooperation e.g. through researcher mobility between universities and industry.
Norway	International Scholarship Scheme	Alloca-tions vary from NOK 200 to NOK 10 mill.	Research Council of Norway	n/a	Funds researcher mobility and networking between institutions from Norway and other countries. Target groups are both incoming and outgoing researchers as well as students. Includes also several region-based programmes.
Norway	Bilateral mobility programme - North America (Leiv Eiriksson)	NOK 6 mill. (yearly)	Research Council of Norway	2004–2014	Ingoing and outgoing mobility, targets PhD candidates and researchers within all scientific fields.

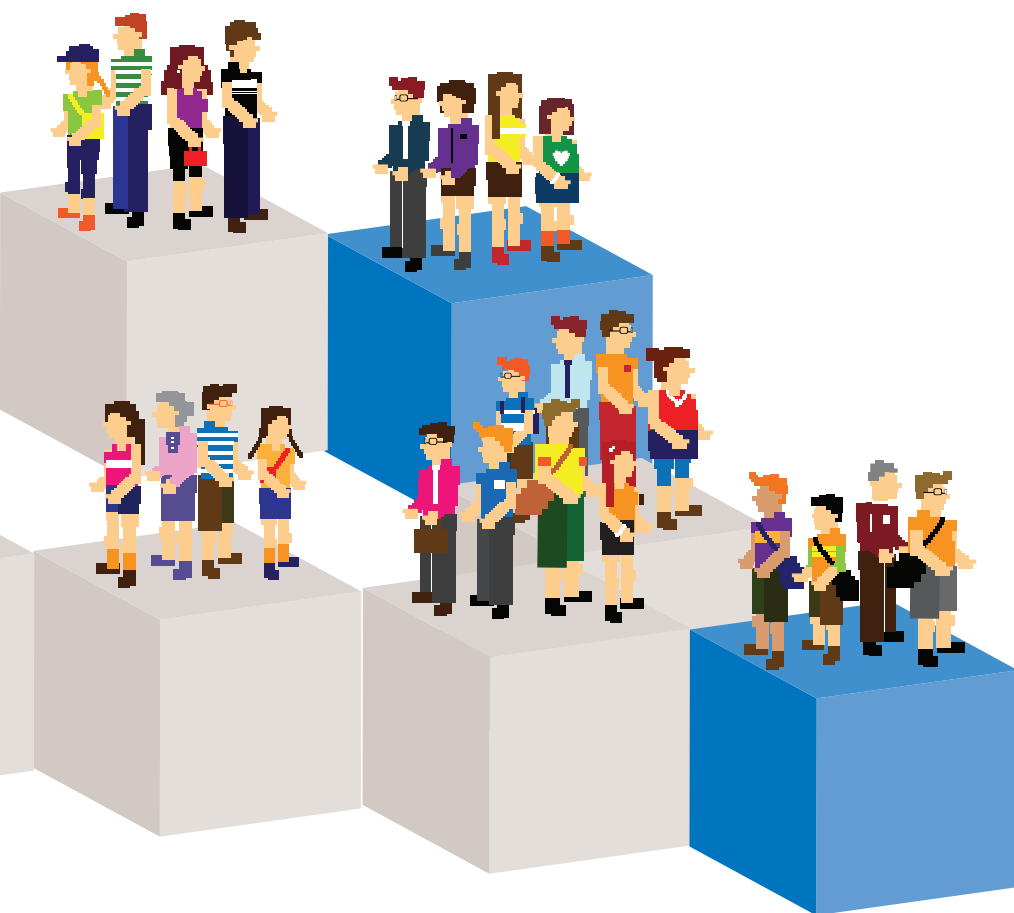
Country	Programme	Budget	Funding agency	Time frame	Short description
Sweden	Strategic Mobility	SEK 15 mill. for 2012-2013	Strategic Research Foundation	2012–2013	Covers salary for a researcher for 4–12 months for work in a sector other than the one where the researcher has his or her ordinary employment.
Sweden	International post-doc	SEK 237 mill. awarded in 2012	Swedish Research Council	2012–	Aims to support international mobility among recently graduated PhDs from Swedish universities. The award is typically for three years, of which the researcher can spend up to one year at a Swedish university.
Sweden	Post-doc scholarships	n/a	Wenner-Gren Foundation	n/a	Aims to support international mobility among recently graduated PhDs from Swedish universities. Award for 1–12 months, which can be prolonged to cover up to 24 months.
Sweden	Sabbatical scholarships	n/a	Wenner-Gren Foundation	n/a	Aims to fund sabbaticals abroad for senior researchers based in Sweden. Mainly targets professors. Award for 3–12 months.
Sweden	Special post-doc scholarships – “Wenner-Gren Fellows”	n/a	Wenner-Gren Foundation	n/a	Aims to fund recently graduated PhDs in biomedicine for advanced post-doctoral studies abroad and thereafter continue as researchers in Sweden. Targets graduates from Swedish universities. Typically awards five scholarships per year. Each award is for three years, of which up to one year (the last) can be spent in Sweden. Can be renewed for two more years.
Sweden	FAS Outgoing International Post-doc fellowship	SEK 19.5 mill. awarded in 2011	Forte (formerly called FAS)	2009–2015	Funds recently graduated PhDs in the health, working life and welfare areas.
Sweden	Teaching sabbatical	n/a	STINT	2013–	Aims at developing both individuals and university departments. Focuses on teaching. STINT ran a previous, similar programme 1999–2013. The sabbatical is one semester.
Sweden	Mobility for growth	EUR 35 mill. (total budget)	VINNOVA	2012–2017	The objective is to support career development for individuals through mobility irrespective of sector. Funds incoming and outgoing transnational mobility for experienced researchers (including a reintegration phase for outgoing mobility) and promotes active international collaborations between involved organisations. Funding for one to three years.



Crossing Borders – Obstacles and incentives to researcher mobility

Study 2: Nordic Crossing

Nordic Institute for Studies in Innovation,
Research and Education (NIFU)



Executive Summary

This particular report provides an updated overview of researcher mobility within and between the Nordic countries. It focuses on issues and approaches, policy traditions and policy measures, as well as on the extent and patterns of researcher mobility in the Nordic region. It takes stock of issues and approaches both in the growing body of literature (chapter 2) and in the policy context (chapter 3). This introductory work provides an important baseline in terms of three basic questions:

- What is meant by “researcher mobility” in the recent literature and in the political context?
- What aspects of researcher mobility are focused on in these two arenas?
- What factors do the literature and policy discourse identify that might influence mobility?

Against this baseline, the report moves on to take account of what is actually happening in the Nordic region. The empirical focus starts in chapter 4, which surveys current policy trends in the Nordic countries as they relate to issues and approaches established in the introductory chapters.

An empirical understanding of the current extent and patterns of researcher mobility is crucial to further refining and adapting effective policy measures on this front. There is, however, no single established way to accurately and empirically take stock of the extent and patterns of researcher mobility. Rather, there are three main avenues that have been pursued: registry (administrative) data, survey data, and CV data. Each has its own advantages and its own disadvantages.¹

This report pursues two lines of enquiry in order to present an up-to-date overview of the extent and patterns of researcher mobility in the Nordic countries. In the first, the responses of two recent European surveys are used to compare the level and orientation of researcher mobility in the Nordic countries in relation to their European neighbours. It demonstrates there are broad similarities — but also specific differences — between Nordic researchers and researchers in other European countries. These results are presented in chapter 5.

The second line of enquiry is based on the unique exploration of nearly 2,000 CVs from three Nordic countries. This new material is presented in chapter 6, which notes concerns about the robustness of survey data and explains how the practical limitations of CV analysis are addressed. A notable aspect of this project is that it is conducted in conjunction with the European SIBOB project², which is developing and adapting common toolsets to improve the empirical basis as a means of better understanding the multifaceted phenomenon. This work fleshes out the patterns of researcher mobility established in the survey activities, illustrating some differences in terms of researcher seniority and country.

Here is a brief digest of these chapters:

To improve the basis for informed policymaking, the first chapter explores how “researcher mobility” is defined and treated in the recent literature. Chapter 2 introduces researcher mobility as a complex phenomenon involving a range of interacting factors, including personal preferences, local factors, the diversity of institutional settings and general economic conditions. In doing so, it makes several important distinctions. First, it distinguishes researcher mobility based on whether it involves crossing geographical or sectorial boundaries. This distinction is basic and important in our context, as “geographic

¹ Registry data is most accurate, but it provides limited contextual information, and cross-country comparisons are not feasible. Survey data can provide information about positions, career development, as well as assessments, but it suffers from low response rates and reliability issues. CV data can provide a good balance between reliability and contextual information about positions and career development, but it is difficult to collect CVs and harder to analyse them.

² <http://sisob.lcc.uma.es>

mobility” implies different effects and has different implications than “sector mobility”. This preliminary chapter also draws a distinction between mobility pursued as a step along a career path or as a step from one type of function to another. Again, the distinction is salient, as factors may be expected to influence “career mobility” differently than those that influence “task/function mobility”. The introduction of different types and modes of researcher mobility is accompanied by a brief inventory of factors and effects associated with them in the literature.

Against this backdrop, [chapter 3](#) goes on to screen the European policy discourse in terms of the way it approaches researcher mobility and how it emphasises relevant effects and factors. It illustrates that the policy discourse is concerned with the balance of inflows and outflows, noting that there are two sides to the coin in terms of attracting and retaining highly qualified researchers. The chapter points out the European emphasis on the researcher and on factors that pave the way for better “career mobility” across Europe.

The Nordic policy framework is highly developed within the wider framework of European initiatives. [Chapter 4](#) takes stock of policy initiatives at the European level and at the level of the individual Nordic countries, while an annex (developed by Faugert in conjunction with NIFU) provides a synthesis of more than 30 current measures in four Nordic countries. Drawing on evidence from the policy discourse and the range of current policy instruments, the chapter demonstrates the high priority given to researcher mobility policy in the Nordic countries. It shows that Nordic policymakers tend to view researcher mobility as a positive contribution to the knowledge economy and that they tend to see high rates of inflows and outflows of researchers as an indication of the vitality and attractiveness of the research system. The chapter as a whole demonstrates that the Nordic countries have come far in harmonising national efforts with ERA mobility policies and that policymakers expect mobility to increase in the coming years.

Up-to-date empirical information is crucial when refining and adapting policy measures here. [Chapter 5](#) provides a brief résumé of what existing surveys (MORE I and SIM-ReC) have said about the propensity for mobility in the higher education sector within and between the Nordic countries as compared with other European countries. These differences are important to understand when comparing mobility patterns in different national and institutional environments and — not least — when considering policy measures to address specific concerns. We found that more than half of the researchers in the sector claim to have engaged in some form of mobility during their careers, that the proportion is highest in the physical and natural sciences, that Nordic researchers tend to be slightly less mobile than European researchers, and that the Nordic countries exhibit somewhat different patterns in terms of research visits. The work also offers more specific evidence about inter-Nordic flows.

In view of the noted limitations of surveys, [chapter 6](#) embarks on a new fact-finding exercise to expand our knowledge about researcher mobility in the Nordic countries. One important feature is that this exploration includes the institute sector, the importance of which in the Nordic context is emphasised in the policy section, and it includes evidence of sector mobility. In short, CVs provide a complementary lens through which to study the researcher mobility question. At the same time, some of the practical difficulties are presented in this exploratory exercise, including the fact that there are important differences between the CVs collected for Sweden, Norway, and Iceland. The CV analysis is broadly consistent with survey findings in terms of the general propensity for international researcher mobility and the way it differs by field of science. But it also shows the impact of the relationship between different forms of mobility and seniority. Here, we identify a significant overlap between international and sector mobility, and we find evidence of considerable linkages between researchers affiliated with private and public bodies.

1. Introduction

Improving the basis for researcher mobility is (re)emerging as a central priority of European research and innovation policy. A number of European studies have been initiated to better understand the patterns of researcher mobility across Europe and the national or institutional conditions that may promote or retard researcher mobility. On this basis, current policy initiatives under the ERA and/or those called for under the Europe 2020 strategy are being directed towards improving conditions for researcher mobility across national and sectorial boundaries. This focus is being pursued on the premise that researcher mobility plays an increasingly important role in the career development of today's researchers and that it ultimately plays a central role in the generation, transfer and sharing of knowledge on a broader basis.

Improving the basis of researcher mobility is also recognised to be a keystone to the continuing development of the knowledge society across the Nordic region. In light of the ongoing European efforts, this current study investigates the phenomenon of researcher mobility within the relatively comparable Nordic countries. We seek to apply the broader European studies to the Nordic countries as a means of better understanding the specific factors that affect research mobility differently in various institutional and national settings.

In this report of the Nordic Crossing project, we seek to improve our knowledge about researcher mobility in the Nordic region. We proceed along four main fronts. In the first, we screen existing (European) studies on researcher mobility and present concepts and discuss main issues related to researcher mobility. In the second case, we go on to screen policy measures in the Nordic countries in order to identify policy instruments and measures that address various challenges associated with researcher mobility. Peculiarities of the regional and country contexts are mentioned.

Against this backdrop, we move on to take stock of existing information about researcher mobility among and between the Nordic countries. As a successor study to MORE 1 and SIM-ReC, we compare the position of Nordic researchers in these recent mobility studies (at the national and international levels). Shortcomings of the survey method lead us in the main empirical section to consult the CVs of nearly 2,000 researchers in three Nordic countries. The CV analysis allows us to triangulate with the results of the earlier survey. The results of the various empirical exercises are summed up in the final section.

2. Mobility issues in the literature

In light of the renewed focus on researcher mobility in Europe (see section 4), there is a growing number of studies that have surveyed the researcher mobility literature. These studies have focused on researcher mobility in terms of the forms it takes, the factors that influence it, its importance at various levels of the “knowledge economy”, and the differences found between different populations. In this section, we compile some of the main observations from some of these studies rather than try to replicate them for the purposes of this small-scale study.

In compiling this section, we focus specifically on two recent studies, namely the MORE report (WP1, 2009) and the SISOB report (WP7, 2012). It is important to emphasise that the section is based to a large degree on listing the observations of the sources we refer to. The aim here is to provide a baseline of how “researcher mobility” is defined and treated in the recent literature. In particular, we consider:

- What is meant by “researcher mobility” in the recent literature?
- What aspects of researcher mobility are focused on? What positive (or negative) effects might mobility have at the different levels?
- What factors are identified in the literature that might promote (or hinder) mobility?

A review of these questions will help as we consider the orientation and aims of relevant policies in the next sections.

2.1 What is meant by “researcher mobility”?

We first take stock of some aspects of researcher mobility that recent academic and policy studies have focused on. One broad conceptualisation comes from the RINDICATE project (2008). It argues that a number of interlinked but distinct sets of *dynamics* are involved in researcher mobility. On the one hand, researcher mobility is part of the changing dynamics of science and labour markets; on the other, it reflects – and affects – changing economic, social and political dynamics. In this context, the RINDICATE project stressed that researcher mobility is “multi-dimensional” in the sense that the transition from one job to another may simultaneously involve a move from one research “system” to another, from one sector to another, from one location/working site to another, and from one team or research group to another, whether or not this involves a change of employer.

The current discourse views researcher mobility as a dynamic phenomenon that affects the development of knowledge generation and accumulation in ways that are increasingly important to modern society. Gibbons et al. (1994) suggest that the traditional, disciplinary-based mode of knowledge production, typified by university research, is increasingly being supplanted by a new mode of knowledge produced “in the context of application”. This problem-oriented knowledge production tends to be interdisciplinary, and the boundaries between “producer” and “consumer” or “user” are blurred – often to the extent of collaboration in the conduct of research between user and researcher (Mode 2). Georghiou (1998) suggests that a number of trends are resulting in an ongoing process of “convergence of public and private research”, whereby three groups of actors in research and innovation “systems” with formerly separate roles – corporate R&D groups, public sector research organisations and university research – are increasingly converging on an increasingly crowded “contract-research space”. A broader perspective within which we can consider these phenomena is the “innovation systems” perspective. In this view, the actors and institutions involved in research and innovation within a nation, region or sector may be considered to constitute a “system of innovation”. This analytical perspective has served to focus the growing policy interest in “systemic” rationales for innovation policy measures such as the furthering of industry-academic linkages.

Geographic mobility versus inter-sector mobility

In general, the literature distinguishes most sharply between geographic mobility (moving between labour markets of different countries/regions) and inter-sector mobility (moving between different labour markets of different sectors - the academic, institute, and private sectors). Geographic mobility involves job transition to a different academic market. In the current (academic as well as policy) discourse, researcher mobility is often thought of in terms of *brain circulation* (i.e. Lawson et al., 2012), whereby human and social capital circulate. The brain-circulation concept harkens back to the established idea of “brain drain”. This conceptualisation of researcher mobility, which first appeared in the 1960s (Rhode, 1991), focused on the loss of researcher capacity by the country of origin. Later research pointed out that geographic mobility can have positive effects for the country of origin as well, as new knowledge can be repatriated as scientists return home (Saxenian, 1999). The conception of brain circulation builds on this understanding that geographic mobility is a *two-way* process (Mahroum, 1998 and Johnson and Regets, 1998), in which more attention has been paid to **the benefits that the sending countries can gain over time** (Meyer, 2001, Barré et al., 2003, Ackers, 2005 and Moguerou, 2006). Despite the increased focus on the potential upside of “brain circulation”, concerns remain about the possible problematic consequences of outflows of researchers, especially in the case of smaller economies that cannot guarantee top-of-the-range salaries and research facilities (MORE Report, WP1, 2009).

Inter-sector mobility is different from geographic mobility in that it involves job transition between sectors. Mobile researchers are the carriers of tacit knowledge. They encourage the recombination of locally generated knowledge and can motivate knowledge shifts in the receiving institution or region. Inter-regional mobility plays a vital role in network-building between different regions and implicitly promotes awareness of different academic markets (Lawson et al., 2012). The University-Industry (UI) literature focuses on researcher mobility primarily as involving job transitions between the academic and private sectors (Lawson et al., 2012). In this literature, inter-sector mobility helps to diffuse knowledge between the academic and private sectors in a way that benefits overall innovation performance. Institutions that optimise the integration conditions for migrating researchers are expected to benefit more from brain circulation (Lawson et al., 2012). The research institute sector is also important in the inter-sectorial dimension of researcher mobility. In Norway and other countries, the institute sector was designed in part to promote knowledge diffusion between the academic and private sectors. A series of studies, including EN MOB and MORE, have attempted to integrate the institute sector into the study of researcher mobility.

Career mobility versus task/function mobility

The literature introduces another distinction in terms of how job transition fits into the researcher’s overall career trajectory. The distinction between career mobility versus function mobility implies a differentiation between who benefits from a change of jobs. Career mobility can be defined as job transition to a higher/lower position to a more/less prestigious university (up- and downwards mobility) (Lawson et al., 2012). Academic careers were (and to some extent still are) characterised by stability, long-term employment relationships (tenure track), and a rigid hierarchical structure (Pezzoni et al., 2009). However, in recent years there have been some changes in promotion patterns. The traditional linear career path from PhD to professor has increasingly ceded to more part-time and short-term contracts (Blaxter et al., 1998; Stephan, 2012). Alternative work arrangements are commonly found in universities, and post-doc appointments have become more common. In particular, the increasing number of post-doc fellowships has raised the question of their effect on researchers’ career development and productivity. Furthermore, the increasing number of post-doc and temporary research positions reinforces the need to treat the job mobility of permanent and temporary academic staff differently, as many temporary positions lead to involuntary job mobility (Lawson et al., 2012).

Task/function mobility can be defined as job transition to a different job function or inter-functional mobility (Lawson et al., 2012). Changing positions may involve a trade-off in relation to the three main types of roles: teaching, research and administration (Blaxter et al., 1998). Leadership positions in academia leave little time for research, and promotion to the managerial career track often marks the end of a research career (Lawson et al., 2012). Related to this, there have been many papers arguing that a shift

towards knowledge transfer and applied research may come at the cost of traditional academic tasks, crowding out basic research and public dissemination (Blumenthal et al., 1996; Heller and Eisenberg, 1998). Knowledge exchange through task mobility may also generate new research projects and ideas (Lawson et al., 2012).

2.2 Effects of researcher mobility

As the last section shows, the current academic discourse tends to view researcher mobility as a dynamic phenomenon that affects the development of knowledge generation and accumulation in ways that are increasingly important to modern society. Researcher mobility facilitates knowledge and technology transfer, the creation of networks and productivity (OECD 2000, 2008 and EC 2001, 2010). From this point, the next important distinction is what sort of effects the literature focuses on and at what level. In general, the literature differentiates between the effects that mobility can have on i) the development of the researcher, ii) the development of individual fields of research, iii) the development of the labour market in general, as well as iv) the development of the overall national economy (see SISOB for a good overview). Some aspects can be pointed out here:

- a. The development of the researcher: e.g. transitioning from student to the workforce, from temporary to permanent employment, along the career ladder in the sector. See for example the life-course perspective (Fernandez-Zubieta et al., 2012).
- b. The development of a field of research or a specific labour market: Job transition between sectors (including visiting positions, mobile inventors, shared affiliations etc.). The aim of keeping up with the state-of-the-art in individual (quickly emerging) fields of science, improving research quality through collaboration and shared research tools (e.g. CERN). See the literature on knowledge transfer, knowledge spillovers, and labour-market perspectives (e.g. Cullen et al., 1998).
- c. The development of individual economies (e.g. green card and attracting researchers versus brain drain). See the economically oriented literature, innovation studies literature, etc.

2.3 Factors that influence researcher mobility

In light of these effects, the next question involves the factors that affect the propensity and direction of researcher mobility. This subsection lists some of the observations made in recent studies about factors at different levels. Here we reemphasise that this subsection culls material directly from the studies attributed.

General factors

Researcher mobility can be said to be driven by the interaction of personal preferences, local factors, diversity of institutional settings and general economic conditions (MORE WP1, 2010). Influences and politics, efficiency of transmission mechanisms, distribution of funds, social and professional factors and personal preferences are systemic in nature (Lane 1991) and act together in shaping systems' features (Hall and Soskice, 2001). The complex interaction between these elements constitutes the backdrop of the many factors influencing the decisions of researchers to move between organisations or even crossing regional or national borders (MORE WP1, 2010).

The geographically bound distribution of knowledge originates from geographically bound search and mobility pattern of researchers. Social embeddedness of researchers plays a crucial role. It impacts negatively on the distance of mobility (Broekel and Binder, 2007). Different modes of knowledge transfer within academia depend on the disciplinary origin, the characteristics of the knowledge being trans-

ferred, and the characteristics of the researchers involved. Institutional characteristics play a role as well (Bekkers and Bodas Freitas, 2008). In this context, the labour-market literature considers transnational labour movements in terms of a number of factors, for example (Cullen et al., 1998):

- classic push-pull dynamics related to unemployment, differences in standard of living and quality of life;
- cultural and kinship drivers;
- educational advancement;
- career development;
- personal development.

Here, mediating institutional factors that help to shape migration patterns include:

- political/institutional, comprising systemic political factors associated with the institutionalisation of cultural and geographical tensions on the one hand and interventionist factors associated with specific measures such as regeneration strategies on the other;
- time-distance issues;
- individual factors including income differentials and quality of life issues, as well as other factors.

In this broad context, the mobility literature tends to focus on administrative and legal factors that shape researcher mobility in particular.

- Administrative and legal barriers can have a negative influence on the mobility decision (Mogu  rou, 2007). Several countries have therefore instituted specific entry regulations for researchers that offer more flexibility (Giannoccolo, 2005). However, the EURODOC survey shows that this barrier is not so important (Brown, 2007).
- LeMouillour et al. (2005) reported the results of the MOMO (Human Resources in Research & Development: Monitoring System on Career Paths and Mobility Flows) project, listing the following as some of the barriers to inter-sectorial mobility that are similar to those of international mobility:
 - Regulatory barriers (certification, civil service code, formal requirements for qualifications, non-recognition of private sector experience for formal academic positions, etc.);
 - Employment practice barriers (flexible or inflexible career paths of researchers);
 - Economic barriers (pension portability, housing costs, spouse employment, social security rights, civil service status of researchers, etc.);
 - Cultural barriers (language, work habits, publication versus confidentiality, or best science versus product development, etc.);
 - Intellectual and industrial property rights (IPR).

In this context, the European Commission has started to address many of the structural concerns. In 2005, the Steering Group on Human Resources and Mobility published 12 recommendations on how research institutes, industry and public authorities can improve the inter-sectorial mobility of researchers (European Commission, 2006). It noted a number of obstacles that appear to hinder researchers from moving to industry, including:

- inadequate training of researchers for working in industry and the lack of relevant skills;
- the need for multilateral training supervision;
- the lack of temporary mobility opportunities;
- the lack of career appraisal for inter-sectorial mobility.

It also noted a number of administrative barriers for the public authorities, including:

- the need to align the interest of the two sides in improving the framework conditions;
- the lack of appraisal of institutions that collaborate;
- the lack of informal networks between academia and SMEs due to the specificities of the latter;
- the lack of funding for training academic staff for a career in industry;
- the lack of awareness regarding the existence of EU instruments that support inter-sectorial mobility.

In addition, the lack of career opportunities in the **home country** can be a push factor to go abroad (Van de Sande, 2005; Faegri et al., 2002) and prevents people from returning after an international stay (Brown, 2007; Faegri et al., 2002). This is especially the case in southern EU countries (Van de Sande, 2005). If there are enough of job opportunities at home, surveys show that researchers wish to stay where they are (Mogu  rou, 2007).

Research and researcher-specific factors

In this context, two general factors have been emphasised as important in facilitating researcher mobility: access to high quality research facilities and access to funding (OECD, 2008; Kannankutty and Burrelli, 2007; Mogu  rou, 2007; TEP, 2007; Giannoccolo, 2005). The availability of financial resources is not only important for stimulating researchers to go abroad but also to stay or to return to their home country (Van de Sande, 2005). Opportunities such as individual fellowship schemes are one measure to lower financial barriers to mobility that has been discussed.

In addition to these factors, the literature points to a host of other factors that may promote or hinder researcher mobility. These combine aspects related to the research environment and the interests/expectations of the individual researcher. Mahroum (2000) demonstrates that different push and pull factors influence the volume, frequency, length, and direction of mobility in the five major channels for international mobility of highly skilled personnel. According to this paper, the main push and pull factors for the international mobility of academics and scientists (towards both industry and other institutions) include the nature and conditions of work and institutional prestige, in addition to bottom-up developments in science.

The characteristics and governance of researcher groups is another decisive factor examined in the literature. *Networking* is a very important factor in international mobility (Mogu  rou, 2007; Guth, 2007), especially for scientists in the academic sector who do not have the same “organisational channels” as researchers in industry (Ackers, 2004). The lack of a good network acts as a barrier to mobility (Brown, 2007; Mogu  rou, 2007). Connections and networks very much determine the choice of “host” institution (Van de Sande, 2005). Being able to work with a particular **team** of specialised researchers is one of the reasons that EU researchers move to Japan (TEP, 2007). The prospect of working with specific people can also be decisive. Some researchers become mobile so they may work with “**star scientists**” in prestigious institutions (OECD, 2008; Faegri et al., 2002; Ackers, 2004). This also offers them access to the associated social networks (OECD, 2008), as well as to the expertise and resources that are concentrated in these “centres of excellence” (Van de Sande, 2005). This creates a multiplying effect whereby “star scientists” go where the best facilities are and in turn their reputation attracts the best young talents (Ackers, 2004).

Other working conditions that have a positive influence include: flat hierarchies, small teams, accessible group leaders/professors, obligations, good equipment, an upbeat team spirit, and a goal-oriented mindset (Faegri et al., 2002). The RESCAR project (ERAWATCH Network ASBL, 2007a) emphasised the importance of the role of team leaders in preparing their PhD students for a job outside academia, thus contributing to higher levels of inter-sectorial mobility especially within older teams.

- More transparent systems of recruitment and award can be an important pull factor for researchers (OECD, 2008). Rigid hierarchies within the professorial system are an important push factor for mobility (Faegri et al., 2002). Likewise, an advancement system based on cronyism instead of quality contributes to the decision to leave the home country and look for “fairer” opportunities (Ackers, 2004).
- Other factors affecting mobility of researchers have also been mentioned: the freedom of debate in an organisation seems to be important (OECD, 2008); the fact that researchers do not always leave their home countries because of wages but instead to work in a stimulating environment (Ackers, 2004); cumbersome bureaucracy can push people to become mobile (Ackers, 2004); the prestige of the graduating organisation which impacts (positively) on the prestige of the subsequent organisations (after mobility), though beyond five years the effect is insignificant (Debackere and Rappa, 1995).

Furthermore, a firm’s scientific openness, which includes publication freedom, is considered an important factor in attracting the best researchers (McMillas and Deeds, 1998 cited in Mahroum, 2000).

Personal factors

Mahroum (2000) asks whether researchers and scientists constitute a distinctive or homogenous group and notes that significant differences exist between different disciplines and sectors, which have a significant impact on the decisions of individuals to be mobile.

- Personal characteristics of the researchers seem to be crucial when considering their mobility patterns. Determinants of an expatriation decision seem to be gender (females seem to be less mobile than males), family ties (the more ties, the lower the likelihood of becoming mobile), and partners (less mobility can be expected for researchers with a partner). In this respect, a distinction is made between the desire to internationalise and the realisation of this desire (Tharenou 2008).
- Inter-organisational mobility seems to be determined by gender and family structure (Valcour and Tolbert 2003).
- Other factors important for the willingness to be internationally mobile are the spouse’s willingness to relocate, relative income, the presence of children and the cultural distance to the location (Dupuis et al., 2009).
- Cultural and linguistic factors can also be important (TEP, 2007; Martin-Rovet and Carlson, 1995).
- Graversen (2002) confirmed that the short-term mobility of researchers in the public sector or university sector is determined by the age of the researcher (i.e. mobility declines as the researcher gets older). Crespi et al. (2007) also found that the individual life cycle has an important effect on all kinds of mobility, since young researchers with less experience and less seniority are more likely to move and tend to move, for example, after applying for or being granted a patent.

The individual's career (path)

Some researchers regard mobility as a means of personal development obtained from travel and experiencing another culture (Ackers, 2004). However, this international experience is not always a pure individual choice, but sometimes a *prerequisite* for career advancement in the home country (OECD, 2008). Career progression in scientific research often requires a very high level of mobility, but this varies between disciplines and national contexts. As there is a growing tendency for a “clustering” of scientific opportunities in the “centres of excellence”, this “expectation of mobility” is reinforced and even pushes researchers into repeated international moves (Ackers, 2004).

Wage growth among employees with indefinite contracts is only possible through mobility. Employees with temporary contracts can renegotiate and achieve wage growth without mobility (Amuedo-Dorantes and Serrano-Padial 2007). Concerning the job characteristics, active researchers are attracted by job opportunities (Kannankutty and Burrelli, 2007). Additionally, less administration/teaching responsibility and flexibility make a job more attractive to a researcher (Faegri et al., 2002). The lack of job stability can be an incentive to look for job opportunities elsewhere.

The individual's personal research trajectory (agenda)

Ackers (2005) reports that scientific networks emerge and function as a result of international collaboration on shared research. Such collaborations and transnational settings can lead to researchers being “socialised” to the idea of migration and to the expectation of mobility being reinforced (Ferro, 2006). Different modes of knowledge transfer within academia depend on the disciplinary origin, the characteristics of the knowledge being transferred, and the characteristics of the researchers involved. Institutional characteristics play a role as well (Bekkers and Bodas Freitas, 2008).

In terms of the researcher, the benefits of mobility for the academic career come largely from the enhancement of social capital (see the life-course perspective in Fernandez-Zubieta et al., 2012). Mobile researchers are able to gain access to academic networks, develop scientific contacts and widen their communication channels. Azoulay et al. (2011) found that researchers moving to a new institution increase their citations from the destination university noticeably, while citation rates from the origin institution are not affected. A positive link has been identified between inventor mobility and productivity (Hoisl, 2007). There is very little evidence, however, regarding the effect of mobility on research productivity and only some weak evidence on the negative effect of immobility (Hagens and Farr, 1973) and the special role of post-doc research abroad (Zubieta, 2009).

2.4 Observations

In this first chapter, we screened existing (European) studies on researcher mobility and provided a preliminary digest of main issues as well as the definition of main concepts based directly on them. We explored how recent literature defines and treats “researcher mobility”. The growing literature emphasised that this is by no means a single, unified phenomenon. We introduced the basic distinction between “geographic mobility” and “inter-sector” mobility, and between “career mobility” and “task/function mobility”. These are different phenomena that are potentially driven by different factors and which have different implications. In this context, we noted that the literature distinguishes between the effects that researcher mobility can have on i) the development of the researcher, ii) the development of individual fields of research, iii) the development of the labour market in general, as well as on iv) the development of the overall national economy (SISOB, 2012). We emphasised that researcher mobility is a complex phenomenon involving a number of interlinked but distinct sets of dynamics, a range of factors, and a footprint of effects that may be “multi-dimensional”. Our initial premise here is that it is important to take account of this complexity when addressing researcher mobility in a way that can be used to design and refine policy, especially in cross-country contexts. In the next section, we take stock of the issues that the policy discourse tends to emphasise when approaching the subject.

3. Mobility issues in a policy context

The previous section established a baseline of how “researcher mobility” has been defined and treated in the recent literature. This section moves on to consider the renewed focus on researcher mobility in the policy discourse in Europe and in the Nordic countries more specifically. Here, we attempt to follow up in line with the questions posed above, namely:

- What is meant by “researcher mobility” in the policy discourse?
- What aspects of researcher mobility are focused on? What positive (or negative) effects might mobility have at the different levels?
- What factors are identified in the literature that might promote (or hinder) mobility?

This section will provide a basis for a deeper investigation (in section 4) of relevant policy initiatives that the Nordic countries have embarked on in conjunction with the European initiatives.

From a policy perspective, mobility of human resources in science and technology is discussed in terms of international geographic mobility and mobility between sectors (university-industry links), as well as in terms of career opportunities for researchers. These notions of researcher mobility are reflected in both programmes and policy discourse at the European and Nordic levels.

Improving the basis for researcher mobility is a central priority of European research and innovation policy. Current policy initiatives under the European Research Area (ERA) and those called for in the Europe 2020 strategy are being directed towards improving conditions for researcher mobility across national and sectorial boundaries. This focus is being pursued on the premise that researcher mobility plays an increasingly important role in the career development of researchers and that it ultimately plays a central role in the generation, transfer and sharing of knowledge on a broader basis.

One of the major challenges is to make researchers more internationally mobile and to provide a more attractive environment for researchers in Europe (EC, 2012). The need for adequate human resources for R&D has been identified as a key challenge since the launch of the Lisbon Strategy in 2000.

3.1 Effects of mobility

In the policy discourse, international mobility is largely viewed as having positive effects not only on scientific fields but also on the economy at large. In the knowledge economy, researchers tend to be viewed as “the core producers of new knowledge and the main agents in its transfer and exploitation [...] and indispensable for a competitive, knowledge-based [EU] economy” (EC, 2008 page 2).

International researcher mobility is conceived of in policy as affecting the development of the researcher from a career perspective (e.g. transitioning from student to the workforce, from temporary to permanent employment, along the career ladder in the sector), but also as affecting the development of the field of science, as it may improve knowledge transfer through collaboration and shared infrastructures (such as CERN). As people convey knowledge between organisations and countries, brain circulation is assumed to have positive effects on the speed and quality of knowledge transfer and on the absorption of new knowledge.

The mobility of scientists is commonly believed to diffuse knowledge and, consequently, to support innovativeness and competitiveness. The availability of highly qualified human resources is fundamental to the development of a knowledge-based society. However, international mobility and its economic effects are multifaceted. The primary effect (often labelled “brain drain/brain gain”) is the transfer of

human capital from the sending country to the recipient country. International mobility may thus result in a growth of innovation in the recipient country with a symmetric loss in the sending country (Inzelt, 2010). A major challenge for policymakers is therefore to support researchers who move abroad, but at the same time to provide an attractive national (or European) research and innovation system.

This is also a commonly expressed assumption in Nordic research policy documents which states that researcher mobility is crucial for maintaining a vital, attractive research system and for contributing to scientific excellence and knowledge transfer. It is much less common for policymakers to express fears about negative outcomes from international mobility, except for the effects of brain drain. Nevertheless, this does not appear to be problematic in a Nordic context; on the contrary, studies have shown that researchers in the Nordic countries are generally not very mobile.

This being said, mobility might have negative side effects on delivering/recipient institutions, firms and states. Previous studies have found that:

- The movement of highly qualified foreign workers in the context of international mobility could have a negative impact on the level of employment and wages of their nationals.
- When key employees leave, there is a potential loss in tacit knowledge and an increase in training costs to replace those who have left.
- Unbalanced inflow and outflow may cause a brain drain in certain geographic areas. This is a fear often expressed by the European Commission and by some countries in the EU. Less advanced EU Member States as well as the EU as a whole may lose the global competition for high-level skills, especially in S&T.
- Poor conditions for innovation and opportunities for S&T personnel at home may incite these professionals to move abroad, at least temporarily. Limited opportunities in higher education and research at home, such as the lack of modern equipment, research capacities below critical mass, scarcity of research grants, differences in tax rates, and a weak entrepreneurial and innovation environment, may all incite S&T workers to emigrate (Inzelt, 2010).

Amongst the Nordic countries, Finland has suffered from an imbalance in the outflow and inflow of researchers for several years, and the issue of strengthening the international dimension of the Finnish research and innovation system is high on the policy agenda. Finland has specific challenges related to attracting researchers from abroad (Viljamaa K., and Lahtinen H., 2013). At the same time, limited career opportunities for researchers with few permanent positions and the dependence on short-term funding are hindering internationalisation. The remuneration level of Finnish researchers has traditionally been lower than in many other European countries. The average weighted total yearly salary in terms of purchasing power standard was 36,646 in Finland in 2006. The corresponding figures for the other Nordic countries were 43,669 (Denmark), 41,813 (Norway), and 47,143 (Sweden). This refers to both the public and private sectors and to universities. However, the recently implemented university reform has given universities more freedom in the matter, and average salaries have increased during the past few years (Viljamaa K., and Lahtinen H., 2013).

3.2 Factors promoting mobility

At the micro level a range of factors are identified as being important in helping researchers with their career opportunities and their ability to transfer between institutions, research sectors and countries. The factors listed below have been identified by policymakers as key factors that promote mobility under the European Partnership for Researchers (ERP) initiative.

Key factors in the ERP are:

- Open recruitment and portability of grants;
- Meeting the social security and supplementary pension needs of mobile researchers;
- Attractive employment and working conditions;
- Enhancement of the training, skills and experience of European researchers.

Experience has shown that high autonomy over hiring procedures at universities and research institutes might have a positive impact on openness of advertisement. On the other hand, the high level of autonomy conferred to universities may also hinder the implementation of such openness as it allows universities to decide on their own strategies regarding openness of advertisement and recruitment (EC, 2008). In Sweden, for instance, before employing a teacher permanently or for a fixed period, the higher education sector (HES) is required to announce the vacancy and provide information about it through advertising or other equivalent procedures, e.g. on the EURAXESS portal. In Denmark the ministerial order on the appointment of academic staff at universities stipulates that “positions at professor and associate professor levels must be posted internationally”. However, this is not mandatory for positions at the assistant professor, post-doc or PhD levels (SGHRM, 2009).

Another factor that promotes mobility is providing non-nationals/non-residents with access to national grants and making them portable across borders. Policies that support the portability of grants is one way to facilitate mobility, which in some cases is prevented by legal and administrative barriers.

Thus the *portability of grants* has been identified as another important factor. While all four Nordic countries have signed the European Heads of Research Councils (EUROHORCs) Letter of Intent “Money Follows Researchers”, there are differences in how the countries organise the implementation of the LOI. In Norway, the Research Council of Norway (RCN) is the signatory of the LOI. However, because RCN-funded contracts are entered into with the research institution, not with the individual researcher, the portability of grants ultimately requires the approval of the institutions. In Sweden, the Swedish Research Council (VR) has signed the agreement. However, not all Swedish institutions subscribe to the “money follows researcher” principle. For instance, the Swedish Research Council follows this principle, but the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning and the Swedish Government Agency for Innovation Systems have established their own systems (i.e. granting stipends or implementing cooperation projects). The Swedish Council for Working Life and Social Research (FAS) has no general rules, but decides from case to case (SGHRM, 2009). Denmark has a similar situation, where the Danish Council for Independent Research (DCIR) participates in the EUROHORCs initiative, authorising researchers who move to other countries to take the remainder of any grant with them, while the DCIR has not signed the LOI (SGHRM, 2009, p. 9).

Several factors have been identified that hinder the propensity of researchers to change positions and move to another country. In line with the issues listed earlier, important obstacles are closely linked to the lack of or inadequate implementation of the four key ERP areas. A weak culture for open, transparent and merit-based recruitment at institutes makes research careers less attractive. This especially affects young researchers who are often employed on temporary short-term contracts. In general, legal and administrative barriers are obstacles that policy can regulate.

In essence, inadequate human resources policies at the university and research institute level, social security obstacles, and insufficient academia-business linkages are factors that affect the level of mobility (EC, 2012). Significant differences between researchers’ salary levels within the European Research Area and compared with other parts of the world is an additional factor in this context (EC, 2007).

3.3 Observations

This chapter has briefly introduced aspects of researcher mobility that recent European policy studies have focused on. In doing so, we have complemented the previous chapter's survey of the recent academic discourse. Here the chapter introduced trends in the European policy discourse in terms of the way it tends to understand researcher mobility and emphasise relevant effects and factors. We found that there is a concern in the policy discourse about balancing inflows and outflows and about attracting and retaining highly qualified researchers. The chapter also noted a European emphasis on the researcher and on factors that pave the way for better "career mobility" across Europe. As we move to the empirical of the report in the next chapter, we will go on to take stock of policy initiatives at the European level and at the level of the individual Nordic countries.

4. Policy overview

In this section, we present an overview of recent policy trends on researcher mobility in the five Nordic countries and at the EU level. We present a broad picture of the policies at the national level and describe some of the most important policy instruments designed to foster ingoing and outgoing mobility. We start the section by describing some of the most important policy developments initiated at the EU level since the beginning of 2000.

4.1 Policy initiatives at the European level

The EU Commission proposed a range of measures to increase the mobility of researchers across the ERA in 2001³ and to promote their career development in 2003⁴. In 2005, it adopted the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers which sets out the roles and responsibilities of researchers and their employers and funders, and ways to make recruitment fairer and more transparent. In the same year, the “scientific visa” package was adopted, aimed at allowing fast-track admission and residence of third country researchers.

The 2007 Green Paper “The European Research Area: New Perspectives” identified the importance of an adequate flow of competent researchers for full realisation of the ERA. The Green Paper states that:

“Researchers should be stimulated by a single labour market with attractive working conditions for both men and women, involving notably the absence of financial or administrative obstacles to trans-national mobility. There should be full opening of academic research positions and national research programmes across Europe, with a strong drive to recruit researchers internationally, and easy movement between disciplines and between the public and private sectors – such mobility becoming a standard feature of a successful research career” (COM(2007) 161).

Moreover, it highlighted a number of recurrent obstacles to both the international and inter-sectorial mobility and noted that a key challenge for Europe is to train, retain and attract more competent researchers:

- Researchers in Europe still find their opportunities curtailed by institutional and national boundaries, poor working conditions and narrow career prospects;
- Academic positions still remain largely reserved for national or even internal staff;
- Transparent competition for recruitment is the exception rather than the rule;
- Mobility across borders or between academia and industry tends to be penalised rather than rewarded;
- Administrations do not usually allow researchers to receive or carry research grants across borders.

Several of these challenges were already listed in the Commission’s strategy from 2001. Endorsement of (voluntary) principles and recommendations in areas such as the portability of social security provisions and supplementary pension rights needs to be met in many cases by concrete implementation at the national level. As one of five⁵ initiatives to follow up the ERA Green Paper, the Commission pro-

3 “A mobility strategy for the European Research Area” COM (2001) 331

4 “Researchers in the European Research Area: one profession, multiple careers” (COM)2003 436.

5 Others related to: IP management by public research organisations, joint programming, pan-European research infrastructures, international S&T cooperation.

posed the development of a partnership with Member States to ensure the “availability of the necessary researchers”⁶. The Commission describes the situation regarding researchers and highlights the following concerns:

- Researchers make up a much smaller share of the workforce in the EU compared to the US and Japan;
- The global competition for the most talented researchers is increasing with new players now able to offer attractive conditions;
- The aging of the research labour force and a shortage of researchers are becoming a problem in some regions and industries.

The partnership focuses on the following four key areas:

- Open recruitment and portability of grants;
- Meeting the social security and supplementary pension needs of mobile researchers;
- Attractive employment and working conditions;
- Enhancing the training, skills and experience of European researchers.

In 2009, the ERA Steering Group on Human Resources and Mobility (SGHRM) published a report describing progress made towards achieving the goals set by the EPR and Member States (including the countries associated with FP7).

Furthermore, the EC Communication *Innovation Union*⁷, which is a flagship initiative of the Europe 2020 strategy, addresses the need to improve conditions for mobile researchers as a key priority for the ERA. Moreover, the ERA Communication⁸ presents the actions that Member States should take in order to complete the ERA by 2014, a goal set up by the European Council. The actions include creating an open labour market for researchers to ensure the removal of barriers to researcher mobility, training and attractive careers. Furthermore, the European Council’s conclusion (February 2011) states that “Europe needs a unified area to attract talent and investment. Remaining gaps must therefore be addressed rapidly and the European Research Area to be completed by 2014 to create a genuine single market for knowledge, research and innovation. In particular, efforts should be made to improve the mobility and career prospects of researchers, the mobility of graduate students and the attractiveness of Europe for foreign researchers” (European Council Conclusions, Feb 2011).

6 Better careers and more mobility: a European partnership for researchers COM (2008) 317.

7 Innovation Union, COM(2010) 546.

8 A reinforced European Research Area Partnership for Excellence and Growth COM(2012) 392.

4.2 Norway

Norwegian policymakers share the international view that the level of researcher mobility, both inward and outward, is an important indicator of the vitality and attractiveness of the national research system (Ministry of Education and Research, 2013). Consequently, they actively support researcher mobility by allocating resources to specific initiatives and instruments. While aggregate data indicate that international mobility has been increasing in the past few years, no recent studies exist that give a complete overview of the actual volume of mobility amongst Norwegian researchers. In particular, there is a large knowledge gap regarding mobility in the private sector (NOU 2011:6).

Despite this knowledge gap, there seems to be a wide consensus amongst policymakers that there is a potential for further increasing the exchange of research personnel with other countries. The three latest white papers on research give high priority to the internationalisation of research, including researcher mobility (Ministry of Education and Research, 2013, Ministry of Education and Research, 2009, and Ministry of Education and Research, 2004).

Cooperation with EU research programmes and harmonisation with ERA processes are especially important. The white paper on research, which was endorsed by the parliament in June 2009 (*Climate for Research*, Report No. 30 (2008- 2009) to the Storting) states that Norway is to be actively engaged in following up the European Partnership for Researchers (EPR), as described in the Communication from the Commission to the Council and the European Parliament of May 2008.⁹ One of the recommendations of the white paper is that Norway should develop a national shadow action plan on human resources and mobility that mirrors the national action plans developed by the EU Member States.

Following the white paper's recommendations on this issue, a Norwegian shadow action plan was drafted for the period 2009-2010. The document presents the status of and/or proposed measures within the four action lines of the partnership. However, in line with the priorities of the white paper, priority is given to action line 3 (*Attractive employment and working conditions, including gender issues*) and action line 4 (*Enhancing the training and skills of European researchers, including inter-sectorial mobility*).

Another example of the importance of EU policy developments in Norwegian research policy is the strategy for strengthening Norway's cooperation in the ERA, presented by the Ministry of Education and Research in 2008. A concrete measure that was highlighted in the strategy and later introduced is the top-up funding available for participants in Marie Skłodowska Curie scheme. The rationale behind this measure is to increase the persistent low number of Norwegian participants in these actions (Ministry of Education and Research, 2013).

Norway has officially signed on to the terms of the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers. The charter and code constitute a set of recommendations for EU and EEA/EFTA countries on working conditions and responsibilities for researchers, research institutes, and research funding organisations. The aim of these principles is to harmonise working conditions for researchers in Europe and thus improve the conditions for increased researcher recruitment and mobility. The value of mobility is a core principle emphasised by the charter. Most of the principles of the charter are established praxis in most Norwegian institutions, and both the Norwegian Association of Higher Education Institutions (UHR) and the Research Council have adhered to the principles since 2006 (Ministry of Education and Research, 2008).

According to the annual letter from the Ministry of Education and Research on the budgetary provisions for the following year, all higher education institutions funded by the government are to publish researcher job vacancies on the EURAXESS Job portal.

The Research Council of Norway (RCN) has signed the EUROHORCs Letter of Intent "Money Follows Researcher". However, because RCN-funded contracts are entered into with the research institution, not with the individual researcher, the portability of grants requires the approval of the institutions.

9 Better Careers and More Mobility. A European Partnership for Researchers, COM (2008)317 and in Council Conclusions of September 2008 (13671/08).

The RCN has the overall responsibility for implementing the government's policies and translating priorities into initiatives and programmes in all fields, including mobility. The few mentioned here have a specific objective to foster mobility.

The Norwegian Centres of Excellence scheme (*Sentre for fremragende forskning*) established in 2003 is described by the RCN as a successful measure for strengthening internationalisation in general and for promoting the recruitment of researchers with an international background in particular. Around 20 per cent of the academic staff working at the centres are foreign citizens (RCN, 2010).

As mentioned earlier, Norwegian researchers applying for an outgoing fellowship programme under the Marie Skłodowska Curie Actions may apply for top-up funding from the RCN. The grant from the RCN covers the cost difference between the mobility allowance from the EU and regular RCN rates for research visits abroad.

Another measure promoting the inflow of researchers is the YGGDRASIL mobility programme that offers grants to highly qualified, international PhD students and younger researchers in connection with research visits in Norway.¹⁰ The programme seeks to make Norway an attractive research destination for highly qualified international PhD students and younger researchers (see also box 1).

In general, there are no formal barriers to foreign researchers finding both permanent and temporary positions at Norwegian research institutions. For EEA/EU citizens and researchers from the US, there are no restrictions according to the duration of their residence in the country. However, the situation is different for researchers from third countries, for whom there are several regulations restricting their entry into the country and the duration of their stay. According to Norwegian law entered into force in 2010, highly skilled immigrants, typically from developing countries such as India, may receive temporary residence and work permits. A maximum of 5,000 such visas and permits may be issued each year. However, this limit has never been reached, as the number of highly skilled immigrants invited to work in Norway is far lower in reality (Scordato and Kallerud, 2009).

Norway's participation in the Bologna Process and the Quality Reform initiated in 2003 are central processes that have broadened the international dimension of universities and higher education institutions. Implementation of the Bologna Process has led to a new degree system in line with international developments (bachelor, master's and PhD), the introduction of a common system of credits (ECTS), grades (A-F), and a number of changes in management and administration within the sector. For instance, as a result of the Quality Reform a right was introduced into Norwegian higher education for students to carry out study periods abroad. This in turn has led Norwegian universities and university colleges to enter into cooperation agreements with a large number of foreign institutions. The result of this has been an increase in the number of Norwegian students who study six months to a year at foreign institutions. Similarly, in recent years Norwegian researcher training has gained a clearer international profile and is attracting more and more foreign applicants (Ministry of Education and Research, 2008).

With regard to barriers to researcher mobility, the relatively late starting age for a doctoral candidate (25-26 years) in Norway is seen as a hindrance. The family situation of these researchers may provide disincentives for going abroad. In fact, a study looking at factors that inhibit mobility and career development of researchers indicates that researchers in the Nordic countries typically perceive difficulties related to childcare arrangements, other caregiving arrangements and personal relationships to be more important than other factors (e.g. language, immigration rules, accommodation, etc.). In addition, the Norwegian model in which doctoral researchers are paid employees may be an additional disincentive for mobility (Rindicate 2008). This can in turn be problematic when the PhD student moves abroad and needs to find salaried work in the country that she/he is moving to.

10 Grant applications are accepted from these 25 countries: Austria, Belgium, Bulgaria, the Czech Republic, Egypt, France, Germany, Greece, Hungary, India, Ireland, Israel, Italy, Japan, Mexico, Netherlands, Poland, Portugal, Romania, Russia, Slovakia, Spain, Switzerland, Turkey, and the United Kingdom.

Box 1: The YGGDRASIL mobility programme

The YGGDRASIL mobility programme provides a current example of a national programme designed to promote researcher mobility. The International Scholarship Section (IS) of the Research Council of Norway has run the YGGDRASIL programme since 2009. The focus of this support measure is on researcher inflows (to Norway). Its stated objectives are:

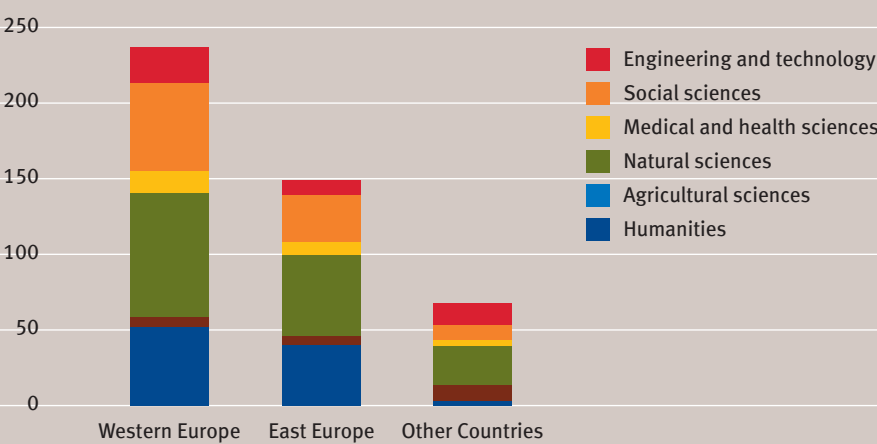
- to contribute to the internationalisation of Norwegian research;
- to make Norway an attractive research destination for highly qualified international PhD students and young researchers;
- to strengthen Norwegian research.

The YGGDRASIL mobility programme provides funding for short-term research visits for researchers in selected countries. It targets PhD students and younger researchers whose home institute is a higher education and/or research institution in one of the following countries (regardless of citizenship):

European countries: All countries, including all Council of Europe member states, except for the Nordic countries (Denmark, Finland, Iceland, Norway and Sweden).

Non-European countries: Argentina, Brazil, Chile, Egypt, India, Israel, Japan, Mexico and South Africa. Thus, the programme currently includes more than 50 countries, regardless of subject area or discipline. The support from the Research Council takes the form of grants which are provided to the Norwegian host institution (university college, university, research institute or museum). The duration of the research visit is from 3 to 12 months. The annual budget for the YGGDRASIL programme is now at NOK 6.5 million. Since 2009, the programme has provided funding for 459 research stays (of a total of 1,193 applications) at various Norwegian research institutions.

Figure 1: Research stays funded by the YGGDRASIL mobility programme in Norway (2009-2013): by field of science and geographical origin. (Source: NIFU Report 33/2013)



The figure presents an overview of the research fields and geographical origins of the 459 successful applicants (2009 until 2013). It shows that the overwhelming majority of YGGDRASIL fellows represent higher education institutions or research institutes in other European countries. The majority hail from Western Europe (note that the Nordic countries are not included). However, there is a strong contingent from Eastern Europe as well. In addition, researchers in other countries represent a fair proportion of the research stays. The figure illustrates a broad distinction between researchers in the traditional sciences (primarily natural sciences but extending to agriculture, health, and engineering) and researchers in the humanities and social sciences. The first category is slightly larger (262) than the latter (197) for the population as a whole. However, this pattern is more pronounced for the Eastern European and – moreover – for the other countries. The YGGDRASIL mobility programme is one of a number of research programmes in the Nordic countries that are currently trying to promote researcher mobility in one form or another. It focuses on short-term research visits, while promoting visits from countries that might otherwise not consider Norway to be a target country.

4.3 Sweden¹¹

Official research and innovation policy documents discuss the importance of researcher mobility for maintaining high quality and vitality within the research system. Recent government bills on research and innovation (Ministry of Education 2008 and Ministry of Education 2012) address the issue of mobility in relation to improving the conditions for young researchers in particular and for creating attractive research career opportunities and conditions. The government considers the latter to be a prerequisite to attracting and recruiting international researchers. Poor career opportunities within Swedish universities have traditionally been a key problem (Öquist and Benner 2012). Hence, the government focuses its attention on the importance of facilitating and stimulating international exchange, especially during the early stages of the research career (Ministry of Education 2008, page 217).

Furthermore, important issues in realising this include social security for individuals and Member States' policies regarding priorities, as well as research infrastructure and collaboration with countries outside the EU. Knowledge transfer between universities, industrial research institutes and other sectors is also discussed in the governmental bill (Ministry of Education 2012).

Like the other Nordic countries, Swedish mobility policies are aligned with policy instruments initiated at the EU level. In 2007 the Association of Swedish Higher Education (SUHF), which organises the 42 Swedish universities and university colleges, signed the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers. Most of the areas covered in the charter and code were already in place by the time they were signed (Melin et al. 2013). However, parts of the charter principles need further improvement. The lack of tenure-track positions in the Swedish HES might discourage non-national applicants from making a long-distance international move, especially if they have families. It is also common for Swedish higher education institutions to recruit their own alumni to permanent positions. This indicates that recruitment and competition procedures are often not tailored to maximise competition, which has a particularly negative impact on potential applicants from other countries (Melin et al. 2013). Research vacancies are not always internationally advertised. Advertisements for research positions are also not always available in English, although most higher education institutions have policies that require most positions to be advertised in English as well. The Swedish HES/PROs and industry are relatively good at publishing research-related positions on the EURAXESS portal.

In recent years, a number of policy measures have been introduced to increase transnational mobility of Swedish researchers, and policymakers highlight transnational mobility as important. Most public research funders specifically target transnational mobility as a positive criterion for research funding or have specific programmes for incoming or outgoing researchers.

The Swedish Research Council (VR) has focused its attention on facilitating the transfer of research grants to other countries in case of relocation. Therefore, on initiative from the European Heads of Research Councils (EUROHORCs), VR has signed the "Money Follows Researcher" (MFR) agreement. According to this agreement, a researcher moving to a country in which there is an organisation that has also signed the MFR agreement can take along the remaining part of a grant. Project Research Grants and Research Equipment Grants (<SEK2m) are eligible for transfer. However, grants for post-doc positions cannot be transferred (Melin et al., 2013), and not all Swedish institutions subscribe to the "money follows researcher" principle. The Swedish Research Council follows the principle, but the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning and the Swedish Government Agency for Innovation Systems have established their own systems (i.e. granting stipends or implementing cooperation projects). The Swedish Council for Working Life and Social Research (FAS) has no general rules, but decides from case to case (SGHRM, 2009).

The Swedish Governmental Agency for Innovation Systems, VINNOVA, has an ongoing programme called Mobility for Growth. The programme period runs from 2012 to at least 2017 with an overall budget of EUR 35 million, of which EUR 10 million is co-funding from the Marie Curie Actions Scheme (VINNOVA 2013).

11 The main source for this section is the ERAWATCH country report 2011 for Sweden.

The programme emphasises the importance of mobility between (public-private) sectors, but international mobility and networks are important aspects of the programme as well.

“A mobile career should be a strong future merit in all sectors conducting research; it will significantly enhance the innovativeness of the private and public sectors by promoting inter-sectorial mobility.” (VINNOVA 2012, page 2)

Other key programmes and instruments supporting mobility in academia and between academia and industry in Sweden include:

- Programmes funded by SSF and STINT through research centres for PhD candidates and post-doctoral research fellows (forskarskolor) and university-industry consortiums in the biomedical sciences as well as in renewable energy and wood-based technology.
- Programmes to increase and support the transnational mobility of post-doctoral research fellows and other skilled researchers between Sweden and other countries such as the VINNOVA – JSPS Joint Projects scheme, which facilitates two-year visiting research fellowships between Sweden and Japan.
- Tax reductions to stimulate the inward mobility of foreign researchers. Such tax incentives include the provision that foreign experts, executives, scientists and researchers only pay tax on 75 per cent of their income during their first three years in Sweden, a benefit that applies to both EU and non-EU researchers.

During the past year most Swedish higher education institutions have increased their efforts to boost the inward and outward flow of researchers, and several conditions make Sweden an attractive destination for PhD students and post-doctoral research fellows. About 50 per cent of the PhD students have studentships that include social benefits. Studentships do not distinguish between Swedish/EU citizens and citizens in other countries. The requirement that non-EU/EEA/Switzerland students pay tuition fees, introduced in 2010, does not apply to PhD students. Most of those reasons also make Sweden attractive to researchers at post-doc levels (Melin et al. 2013).

Since 2006, EU/EEA citizens do not need to obtain a work permit to stay in Sweden. For stays longer than three months, researchers must register with the Swedish Migration Board. Citizens of a Nordic country (Norway, Finland, Iceland, and Denmark) do not need a residence permit. As for third country citizens, new legislation came into force on 1 July 2008, which is based on the EU's Researchers Visa Directive. According to these rules, no work permit is needed if the purpose of the stay is to teach or lecture during a period of less than three months. If the purpose is to be hired as a researcher for a longer period of time, a work permit is required before arrival. One of the main hindrances in this context is that foreign researchers can only be affiliated with Swedish higher education institutions for a maximum period of two years (Melin et al. 2013).

In 2010, the Ministry of Education formulated an assignment to describe and map the objectives and conditions for researcher mobility in light of the EU (Myrman 2011). The background for these efforts was European education and research policy (Lisbon strategy, European Research Area, Europe 2020) and the recognition that Swedish efforts in this area needed to be strengthened. The report focuses on mobility in the higher education sector, initiatives in funding agencies relating to mobility and researcher mobility in the EU programme People (which includes Marie Curie Actions). The report also provides an account of researchers' experiences based on interviews, and gives examples of some of the pitfalls of the existing system and conditions that researchers face when undertaking part of their research abroad (during and after doctoral studies). The researchers interviewed pointed out potential problems that could arise with regard to social security abroad and upon returning to Sweden, as well as conditions for combining a career in academia with raising a family. These interviews provide examples of limitations in the existing system, but they also indicated how the current structure for academic positions may be improved.

An interesting observation in the Myrman report is that the willingness of Swedish academic researchers to change employers in international mobility is rather low in the group of researchers that have not yet done so. In this group, more than two-thirds (72%) of researchers had no desire to change academic employers in the future (Myrman, 2011).

4.4 Denmark¹²

According to an analysis by the Danish government, there is an ongoing, high demand for highly skilled researchers in the public and private sectors (Danish government, 2007). However, documents note that there are several problems on the supply side and that adequate incentives for pursuing a research career are lacking. Barriers to the recruitment and retention of researchers who wish to pursue a research career at Danish universities are:

- Varying quality of PhD education;
- Lack of post-doc positions and continuous employment of younger researchers;
- Limited inter-sectorial mobility of researchers;
- Bureaucratic, time-consuming employment procedures at universities;
- Limited opportunities for career development;
- Non-competitive salaries for young researchers;
- Poor working environment.

The evaluation report on Danish PhD education pointed out that foreign applicants are under-represented among the PhD students admitted (Ministry of Science, Technology and Innovation, 2006). The evaluators recommended further that the general level of admission to Danish PhD education should be increased so as to include about an average of 25 per cent foreign students (Klitkou, 2009). The researcher taxation scheme in place since 1992 now also benefits foreign researchers. In general, for all foreign researchers, payments are also made to national pension funds in addition to salaries. The terms of employment of foreign researchers correspond with those of the scientific staff at universities in general. When considering the cost-of-living, the level of remuneration for researchers in Denmark is high, but it is still below remuneration levels in the US (European Commission, 2007; p. 20).

In January 2009, all Danish universities joined the “European Charter for Researchers” and the “Code of Conduct for the Recruitment of Researchers”. Open, competition-based recruitment of researchers has been implemented at Danish higher education institutions and other public research organisations. Research job vacancies are published on the EURES portal, the EURAXESS portal or on the job portals of the various organisations. The ministerial order on the appointment of academic staff at universities stipulates that “positions at professor and associate professor levels have to be posted internationally”, while this is not mandatory for assistant professor, post-doc or PhD-level positions (SGHRM, 2009, p. 8).

Denmark participates in international cooperation through the Europass Framework, and is active in the implementation of the Bologna Process on higher education, and the Lisbon Recognition Convention. Recognising academic and professional qualifications from other countries is a prerequisite for foreign researchers to be able to apply for researcher positions in Denmark. The Danish Council for Independent Research (DCIR) participates in the EUROHORCs initiative, which authorises researchers moving to other countries to take the remainder of any grants with them, while the DCSR has not signed the Letter of Intent “Money Follows Researchers” (SGHRM, 2009, p. 9).

At the programme level the *Sapere Aude* programme run by the Danish Council for Independent Research (DFF) promotes (indirectly) the mobility of researchers. The programme is designed as a talent development programme for the elite. Interestingly, there are no requirements regarding the applicants’ citizenship, the location of research institutions or the specific venue for carrying out the research activities applied for. However, in all cases, a general assessment criterion is the extent to which the project applied for will benefit Danish research. Funding for research visits at institutions outside Denmark is provided under a specific FSE scheme.

¹² The main source for this section is the ERAWATCH country report 2011 for Denmark and ERAWATCH policy mix report 2009 for Denmark.

4.5 Finland

While strengthening the international dimension of the Finnish research and innovation system has been on the policy agenda for several years, evaluations continue to define Finland as “exceptionally inward-looking in these respects” (Ministry of Employment and the Economy and the Ministry of Education, 2009 page 38). According to available indicators such as the mobility of academics, Finland is among the least internationally oriented countries. The share of international teacher and researcher visits from and to Finland has decreased slightly in the 2000s, contrary to expectations and explicit policy goals (Ministry of Employment and the Economy and the Ministry of Education, 2010 and Research and Innovation Council of Finland, 2009). Attracting more international researchers is thus a particular challenge for Finland compared to the other Nordic countries. This applies not only to academics, but also to foreign innovation experts (Ministry of Finance, 2008).

At the policy level, the Research and Innovation Council’s guidelines for 2010-2015 point to a number of structural reforms that are necessary in order to improve the conditions for researcher mobility in particular. They mention, for instance:

- The need for the recruitment practices of education, research and innovation organisations to be made more transparent to attract international students, researchers and experts. Research facilities should be allocated to foreigners under flexible terms, and quickly when necessary;
- Residence and work permits, social security and the student financial aid scheme need to be developed so that they support the recruitment of students, researchers and experts to Finland (Research and Innovation Council of Finland, 2010).

Since 2008, the Finnish research, education and innovation system has been undergoing significant reforms. One objective of the new Universities’ Act, which entered into force in 2009, is to support the opportunities of universities to implement better human resources policies and to make research careers more attractive. Moreover, as part of the reform process, the Ministry of Education has drafted an internationalisation strategy for higher education which aims to strengthen the international attractiveness of Finnish universities. The main objectives of the strategy are to increase the capacity of higher education institutions to offer high-standard education in foreign languages and increase the share of foreign teachers, researchers and degree students (Ministry of Education, 2009). Previous reforms have been formulated in line with EU initiatives, and since 2005 Finland has had a degree structure in their HES that corresponds with the Bologna structure. This has improved the comparability and recognition of degrees awarded in various EU Member States. The uniform European Credit Transfer System and the Diploma Supplement have also been adopted.

There are only few specific instruments for attracting experts from abroad, but some changes have been made in recent years to indirectly render the Finnish labour market more open for foreign researchers and other experts (Viljamaa K., and Lahtinen H., 2013). The ERAWATCH country report lists some of these changes:

- The Aliens Act, which gives a specific route for experts with a fixed period tax relief programme for foreign experts;
- Establishment of a specific mobility portal. The EURAXESS Finland portal provides information on Finnish research, job and funding opportunities to foreign researchers planning to come to Finland or who are already in the country;
- The European Charter for Researchers and the European Code of Conduct for the Recruitment of Researchers have been signed by the Academy of Finland and the Universities Finland UNIFI (representing all universities);
- A specific strategy at the Academy of Finland for the development of research careers since 2006;
- Agreement between the universities and the Ministry of Education on offering more master’s degree programmes in English;
- Implementation of a four-tier research education model and an increase in funding opportunities at the post-doc phase to attract researchers at the post-doc level (Viljamaa K., and Lahtinen H, 2013).

The ERAWATCH report also describes some of the more specific challenges facing the Finnish research system related to attracting researchers from abroad. The limited career opportunities for researchers due to few permanent positions and the dependence on short-term funding are described as challenging. In addition, the remuneration level has been lower than in many other European countries. The average weighted total yearly salary in terms of purchasing power standard was 36,646 in Finland in 2006. The corresponding figures for the other Nordic countries were 43,669 (Denmark), 41,813 (Norway), and 47,143 (Sweden). This refers both to the public and private sectors and to universities. However, the university reform has given universities more freedom in the matter, and average salaries have increased in the past few years. Additionally, the nature of administrative procedures at universities has proved to be a challenge. While there are rules and procedures to help foreign researchers to work in Finland, information on these is fragmented, and there has not been a dedicated programme to facilitate the immigration of foreign experts. The private sector, except for a few international companies, has not been very keen to recruit foreign researchers either. The administrative limitations at the universities more generally have also made it more difficult to compete internationally (Viljamaa K., and Lahtinen H., 2013).

At the programme level, FiDiPro (Finland Distinguished Professor Programme) is a joint funding programme under the Academy of Finland and Tekes to recruit scientists from abroad, offering fixed-term research and teaching posts to top foreign scientists or to Finnish scientists who have worked for a long time abroad at the professorial level. The aim is to create a new kind of international cooperation between basic research, applied research companies' research and development activity. The first FiDiPro professors began their work in early 2007. Tekes encourages the international mobility of researchers engaged in research projects by funding the costs incurred by research organisations arising from these activities (Ministry of Finance, 2008).

Together with the other Nordic countries and the National Science Foundation (NSF) in the US, Finland has agreed to take part in the *NSF Research Graduate Fellows Nordic Research Opportunity*. According to the agreement, the US National Science Foundation (NSF), the Research Council of Norway (RCN), the Academy of Finland and the Finnish Funding Agency for Technology and Innovation (Tekes), the Danish National Research Foundation (DNRF) and the Swedish Research Council (VR) support research visits for NSF research graduates on a competitive basis. In Finland, research activities may be proposed at Centres of Excellence and with Academy professors. The Finnish host institutions cover the fellowship-holder's living costs, typically as salary, as well as research-related costs in Finland.¹³

¹³ For more information see: http://www.nsf.gov/pubs/2013/nsf13022/nsf13022.jsp?WT.mc_id=USNSF_25&WT.mc_ev=click

4.6 Iceland

Like the other four Nordic countries, internationalisation of research is a key policy objective for Icelandic policymakers. In the wake of the financial crisis that severely affected the country in autumn 2008, policymakers have had to deal with concerns about a large outflow of qualified human resources. At the same time, the weak Icelandic currency is a considerable barrier that deters students and researchers with Icelandic salaries from going abroad (Scordato and Aanstad, 2013). Against this backdrop, the Icelandic Research Fund, managed by the Icelandic Centre for Research (Rannis), was established as the first programme dedicated to researcher mobility with co-funding from the FP7 People programme. The programme offers incoming, outgoing and reintegration grants, irrespective of the applicant's nationality (Taxell et al. 2009). Rannis also participates in the EURAXESS service network.

Traditionally, there has been a lack of specific policies for attracting foreign researchers (Taxell et al. 2009), and financial resources for researcher mobility have been scarce. A further problem has been the limited use of international programmes, such as the Marie Curie mobility programme managed by the European Commission on behalf of institutes and private companies (STPC 2010-2012). Because of the small size of the domestic tertiary education and research system, PhD programmes tend to grant joint degrees with foreign institutions (Scordato and Aanstad, 2013). All seven universities have signed the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers. Iceland does not participate in the scientific visa package for long-term admission. However, there are no formal barriers to recruiting non-nationals for permanent research and academic positions (Scordato and Aanstad, 2013).

4.7 Policy trends in the Nordic research institute landscape – a brief overview

As indicated in the introduction, there are some country peculiarities within the Nordic region. One aspect involves the role of the size and extent of the research institute sector. The role of research performing organisations is not uniform in the Nordic countries. Since these RTOs can play an important role in the division of labour with universities and hospitals, it is worth taking into account the policy context related to this sector.

In recent years, the need for structural change and strategic reorientation of R&D policies has become increasingly evident in all five Nordic countries. This comes in response to the increased competition at the international level and in emerging markets, which puts fierce pressure on small knowledge economies such as the Nordic countries. In this context, universities and research institutes have become the target of policy reforms, and restructuring processes have started or are underway. A question that recent policy reforms have addressed is whether research institutes should merge into larger entities (i.e. with universities or with other institutes) in order to create critical mass and allow for more cross-sectorial and cross-disciplinary research. The tendency towards the marketisation of research institutes has weakened the institute sector in the sense that it has driven the core funding of the sector down to levels that may in a longer perspective undermine their functionality as research and advanced analysis organisations. This is acknowledged by governments in several countries, and the structure and funding of and policies for institutes are therefore under discussion or undergoing reform. This situation is not unique to the Nordic countries, but similar policy tendencies exist in a range of European countries (Solberg et al. 2012, page 16). Based on the characteristics of their research and innovation systems, the Nordic countries have taken rather different policy approaches.

The Swedish R&D system has long been characterised by a clear dominance of publicly funded research at universities on the one hand and private sector research as an important research performer on the other hand. Recent reforms emphasise the role of institutes as an innovation infrastructure. There is therefore greater focus on application-oriented research-based knowledge. Recently many Swedish institutes have become limited companies with partially private and partially public ownership. Public ownership of the Swedish institutes has been organised into a holding company called RISE - Research Institutes of Sweden Holding AB, comprising four corporate groups with a total of 17 RTOs and their

subsidiaries. Today, the RISE institutes account for about two-thirds of the Swedish institute sector (Gov. Bill 2012). Public support for research institutes in Sweden has been rather low in the past, and in fact diminished substantially in the late 1990s. However, the two recent governmental bills on research and innovation (2008 and 2012) have strengthened the role of the institute sector, and annual funds are increasing. Institutes have undergone merger processes and some institutes have closed down. One example of the latter is the closure in 2007 of the National Institute for Working Life (*Arbetslivsinstitutet*). The coordination and focus on the predefined areas reflects the perceived weakness in the Swedish system characterised by fragmentation and little coordination. Some critics have argued that the overall trend towards policies that concentrate resources, such as the establishment of elite research environments in Centres of Excellence and strategic research areas, have had undesired effects on established research leaders and consequences for aspects such as gender equality and career paths for younger scholars (Sandström, U. et al. 2010, Sveriges Unga Akademi 2012).

While policy reforms in Sweden have strengthened the role of research institutes in order to bridge the gap between industry and academia, in Denmark reforms have seemingly moved in the opposite direction. Most government research institutes (GRIs) have merged with the higher education institutions. This has resulted in a more dualistic system in Denmark, although a network of approved technological service providers (GTS institutes) remains an important bridge between academic research and industry. The university merger process was voluntary and embedded in the Danish Globalisation Strategy. The main aims of the integration of GRIs into universities have been to stimulate research synergies between sectors, fertilise the university sector with practice-oriented research and make additional research resources available for educational processes. Denmark now has eight universities (before the merger there were 12 universities and 13 GRIs), and about two-thirds of all public Danish research is now conducted at the three large universities (University of Copenhagen, Aarhus University and the Technical University). In addition to the five remaining GRIs there are nine independent GTS institutions which have retained an important responsibility for science-industry linkages.

The extensive mergers between Danish universities and public research institutes have been evaluated at several stages of the process. In general, the findings of these evaluations show that across the majority of the merged institutions, the employees' experience of the changes and their implications for their current job situation is remarkably negative (Bloch, Pedersen and Aagaard, 2012). The dissatisfaction concerns both career paths and career choices. The evaluations also show that both freedom of research and service to authorities seem to have suffered in the process (Solberg et al. 2012).

In light of these recent policy trends and reforms of the university and institute sector in Sweden and Denmark, it seems clear that the situation for researchers has not improved. Important aspects such as career opportunities for researchers have suffered. When looking at the conditions that are important for stimulating researcher mobility, the attractiveness of pursuing a research career and working conditions at universities are important. This is clearly recognised by policymakers and is addressed in official policy documents (see Swedish Gov. Bill on research from 2008 as an example). While there is no evidence to date of any undesired effects of university mergers directly on researcher mobility, this may be an unintended result of these policies in the long run.

Structural reforms are also high on the Finnish agenda. In Finland, universities have undergone major structural reforms since the introduction of the new University Act on 1 January 2010. The universities are no longer state-owned entities, but independent legal bodies. They have become more autonomous, both in terms of funding allocations and the management of human resources, and a range of universi-

ties have merged with larger entities. An example is the new Aalto University that includes the former Helsinki University of Technology, the Helsinki School of Economics and the University of Art and Design Helsinki. In terms of reforming the institute sector, there are ongoing discussions as to whether sector institutes should merge into larger entities and whether a large share of the institutes' core funding should be reallocated through a system of competition-based funding. In contrast to the Danish approach, Finland is focusing more on mergers between research institutes rather than incorporating institutes into universities. An expert group appointed by the Research and Innovation Council in 2012 has presented extensive reform proposals in this direction (Finnish Research and Innovation Council, 2012). Their proposals entail a radical process of mergers and a general shift from sector-oriented funding to a funding mechanism more targeted at research for broader societal issues. It remains to be seen whether and in what form these proposals will be implemented. However, previous attempts to make changes to the core funding system of Finnish research institutes have not been well received by stakeholders and have consequently been rejected (Solberg et al. 2012).

Like in Finland, a significant share of R&D activity in Norway is performed by research institutes. Roughly, half of all public funding in these two countries is considered to have an applied focus. Compared to the situation in the other Nordic countries, Norwegian firms have the highest propensity to purchase R&D from outside the concern. Thus Norway has a relatively large domestic market for applied research (Solberg, et al. 2012). There is an ongoing debate in Norway on the future of the institute sector.

The Research Council of Norway (RCN) has always had strategic responsibility for the research institutes. In line with the government's policy to make research-performing institutions more autonomous, a new performance-based research-funding system for reallocating some of the core funding among the institutes was introduced in 2009.

4.8 Observations

In this section we have presented some of the main trends in the Nordic countries with regards to policies for researcher mobility. Generally, Nordic policymakers argue that mobility makes a positive contribution to the knowledge economy, and a high rate of inflows and outflows of researchers is seen as an indication of the vitality and attractiveness of the research system. The policy expectation is that mobility should increase in the coming years. Based on the policy discourse and the range of policy instruments supporting mobility, it is evident that researcher mobility is a highly prioritised policy field in the Nordic countries. A range of diverse policy instruments exist that support these policy goals and expectations. A common feature of these instruments is that they target researchers at various career stages (from early-stage PhD students and post-doc research fellows to outstanding researchers) and include tax incentives to stimulate the inward mobility of researchers as well as instruments that support inter-sectorial mobility.

The Nordic countries have also come far in harmonising their activities with ERA mobility policies. An indication of this is the engagement of the Nordic institutions in the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers and participation in the EURAXESS service network. Moreover, the issue of portability of grants is being addressed, although in different ways, by adhering to the "money follows researcher" principle launched by EUROHORCs. In sum, we could say that policy measures are largely designed to address geographic mobility rather than other aspects that affect mobility (see section 2 for an overview of types of mobility). Administrative and legal barriers are also addressed, but it seems that there is still room for improving those types of issues. Other factors related to career opportunities are identified as important factors for mobility, but these appear to be targeted to a lesser extent by policies.

5. Empirical studies

The success of forward-looking initiatives in the Nordic region – and in Europe more generally – depends on reliable, up-to-date empirical work on changing researcher mobility patterns. The Nordic countries have traditionally held a strong position both in terms of their interest in cultivating researcher mobility and, relatedly, in terms of generating a strong empirical basis on which to understand the phenomenon better.

In this section, we start by establishing a baseline for international mobility patterns among European researchers. To do so, we use data from the MORE I mobility survey carried out among researchers in the higher education sector in the EU27 in 2009. This includes Denmark, Sweden, and Finland, which we compare with the other countries. In the following section, this presentation is complemented and extended using the recent SIM-ReC study. In addition to Sweden, SIM-ReC encompasses both the HES and the institute sector in Norway.

5.1 International mobility patterns among EU27 researchers

We start by presenting data from the Mobility Survey of the Higher Education Sector in the MORE I study.¹⁴ The entire sample of EU27 researchers therefore consists of 4,501 persons.¹⁵ We have divided this group into two subgroups: researchers from the Nordic countries (i.e. Denmark, Finland and Sweden, since Norway and Iceland are not EU members) and researchers from non-Nordic countries (i.e. EU27 countries other than the Nordic countries). Thereafter we have examined international mobility patterns among these groups. Four mobility patterns are used:

- (i) International mobility during the researcher's career;
- (ii) International mobility involving a move to a new employer in another country;
- (iii) International mobility involving a research visit to another country without a change of employer;
- (iv) International mobility in the last three years.

¹⁴ For information about MORE, see MORE (2010). Duplicates have been removed.

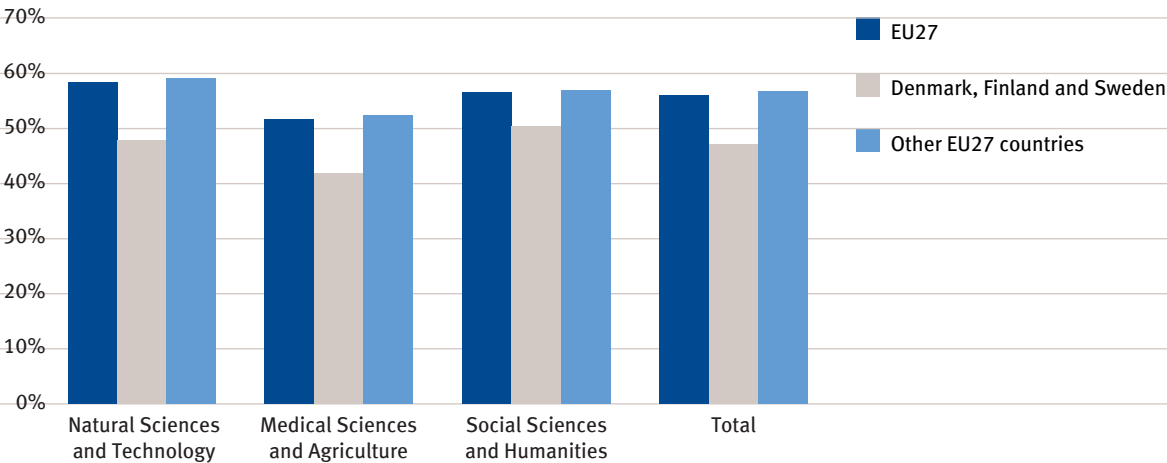
¹⁵ In MORE (2010) the entire sample consists of 4,538 persons.

International mobility during the research career

Figure 2¹⁶ shows that 56 per cent of the EU27 researcher population in the higher education sector is estimated to have been internationally mobile researchers, i.e. they have worked (including research visits of three months duration or longer) in a country other than the country where they attained their highest educational degree. The figure also shows that natural sciences and technology fields have the highest share of internationally mobile researchers (58%), while medical sciences and agriculture fields have the lowest share (52%). The corresponding share for social sciences and humanities fields is 57 per cent.

In addition, we see from Figure 2 that the share of internationally mobile researchers is lower among Nordic researchers (47%) than among non-Nordic researchers (57%). This share is highest for those in the natural sciences and technology among non-Nordic researchers (59%), and highest for those in the social sciences and humanities among Nordic researchers (50%). Researchers in the medical sciences and agriculture have the lowest share for both Nordic researchers (42%) and non-Nordic researchers (52%).

Figure 2: Estimated share of researchers in the higher education sector in EU27 with international mobility experience at least once in their research career by field of science. n=4,501



Source: Mobility Survey of the Higher Education Sector.

Key points:

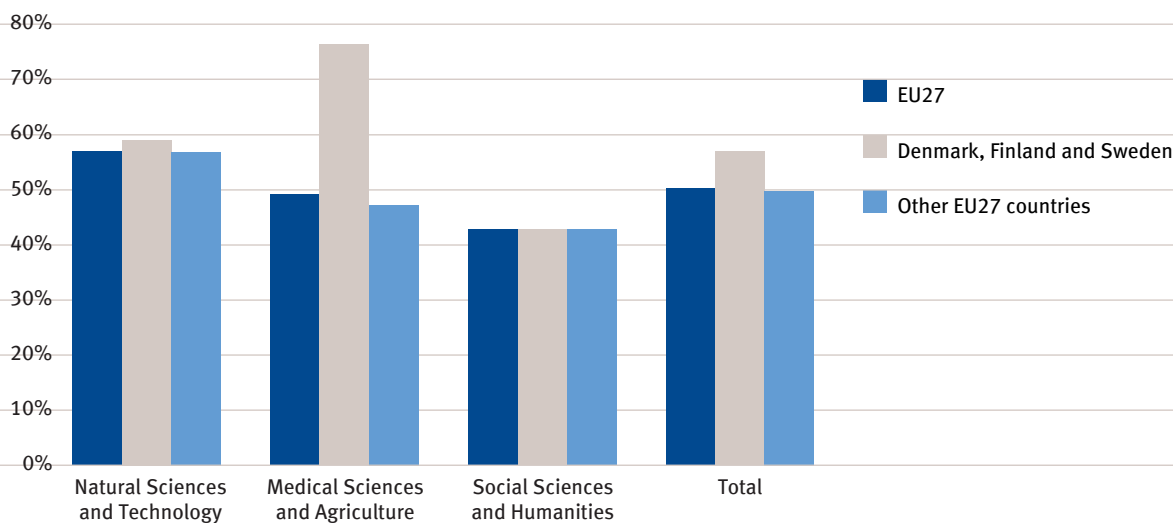
- Over half (56%) of the EU27 researchers in the HES have been internationally mobile during their careers;
- The level of mobility varies between scientific fields. Natural sciences and technology fields have the highest share;
- The share of internationally mobile researchers is lower among Nordic researchers (47%) than among non-Nordic researchers;
- But there is no relative difference to EU27 by field of science.

¹⁶ Notes to figures in chapter five are listed in the Annex.

International mobility involving a move to a new employer in another country

Figure 3 shows that approximate 50 per cent of the internationally mobile researchers have experienced at least one move to a new employer in another country in their research career. This share is highest for researchers in the natural sciences and technology (57%), and lowest for those in the social sciences and humanities (43%). We see that the share of researchers who have experienced of change of job is higher among Nordic researchers (57%) than among non-Nordic researchers (50%). This share is much higher among Nordic researchers (76%) than among non-Nordic researchers (47%) in the medical sciences and agriculture, while there are small differences between the two main groups of researchers in the natural sciences and technology. The share is the same for both main groups in the social sciences and humanities (43%).

Figure 3: Estimated shares of researchers in the higher education sector in EU27 who have experienced at least one move to a new employer in another country in their research career by field of science. Estimated shares among all internationally mobile researchers. n=2,562.



Source: The Mobility Survey of the Higher Education Sector.

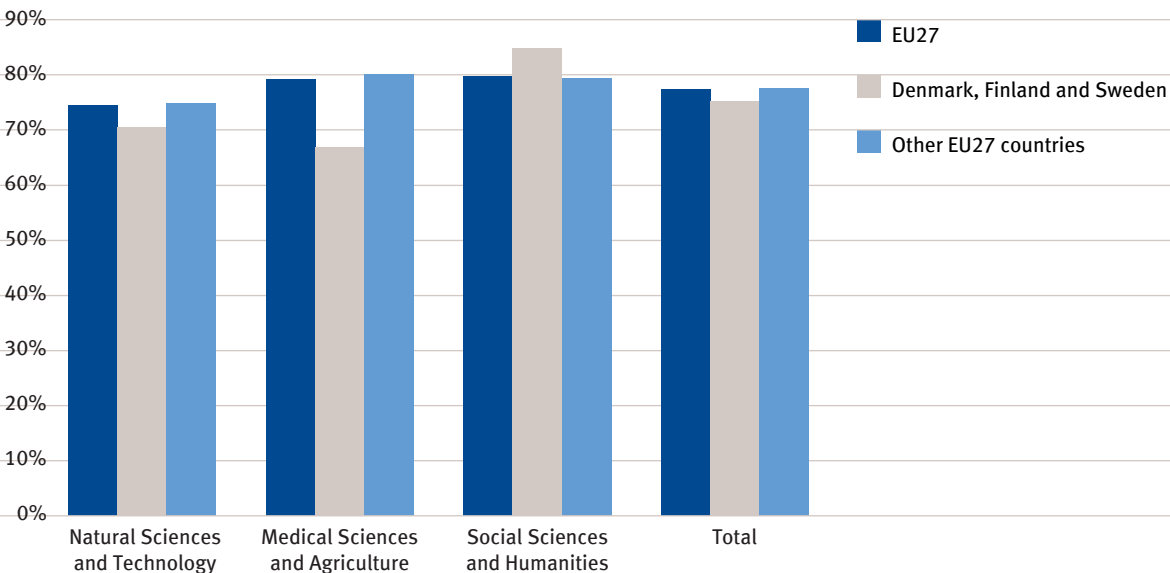
Key points:

- The share of researchers who have experienced a change of job is somewhat higher among Nordic researchers (57%) than among non-Nordic researchers (50%);
- This share is considerably higher in specific fields of science: it is much higher among Nordic researchers (76%) than among non-Nordic researchers (47%) in the medical sciences and agriculture.

International mobility involving a research visit to another country without a change of employer

Seventy-eight per cent of the internationally mobile researchers have conducted at least one research visit in another country in their research career. This is seen in Figure 4. We find the lowest share for researchers in the natural sciences and technology (75%), while the share is the same in the medical sciences and agriculture and the social sciences and humanities (80%). Nordic researchers have a higher share of researchers who have conducted research visits in the social sciences and humanities compared with non-Nordic researchers, but Nordic researchers have a relatively lower share in the two other main scientific fields.

Figure 4: Estimated share of researchers in the higher education sector in EU27 who have conducted at least one research visit in another country in their research career by field of science. Estimated shares among all internationally mobile researchers. n=2,562.



Source: The Mobility Survey of the Higher Education Sector.

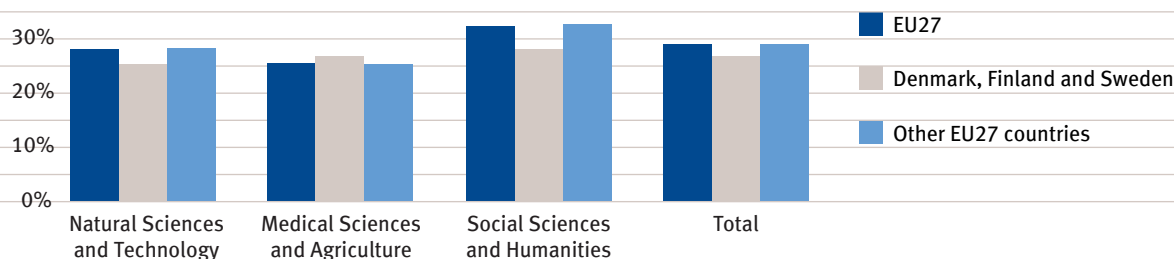
Key points:

- Seventy-eight per cent of the internationally mobile researchers have conducted at least one research visit in another country in their research career;
- Nordic researchers have a higher share of researchers who have conducted research visits in the social sciences and humanities compared with non-Nordic researchers.

International mobility in the last three years

Figure 2 focuses on the international mobility of researchers during their entire research careers, while Figure 5 limits the time period to the last three years. Figure 5 shows that 29 per cent of the EU27 researcher population in the higher education sector has been internationally mobile in the last three years. This share is lower for Nordic researchers (27%) than for non-Nordic researchers (29%). EU27 researchers in the social sciences and humanities have the highest share of incidents of recent international mobility (32%), while this share is lowest in the medical sciences and agriculture (26%). The same pattern holds for non-Nordic researchers. For Nordic researchers this share is also highest in the social sciences and humanities, but lowest in the natural sciences and technology.

Figure 5: Estimated shares of researchers who have been internationally mobile in the last three years by field of science. Shares among all researchers in the higher education sector in EU27. n=4,501.



Source: The Mobility Survey of the Higher Education Sector.

Key points:

- Twenty-nine per cent of the EU27 researcher population in the higher education sector has been internationally mobile in the last three years. This share is somewhat lower for Nordic researchers (27%) than for non-Nordic researchers (29%);
- For Nordic researchers this share is highest in the social sciences and humanities and lowest in the natural sciences and technology.

5.2 Researcher mobility among researchers from 11 European countries

In this section we use data from the SIM-ReC project, which is a study of international mobility and researchers' career development. This project aimed to shed some light on the consequences of international mobility on researchers' patterns of collaboration, academic performance and career consolidation. SIM-ReC ("Study on International Mobility and Researchers' Career Development") was a 10-country study carried out for ERAWATCH Network on behalf of the IPTS. It focused on the successful design and implementation of a survey to better understand the extent of researcher mobility and the effects it has on aspects such as collaborations, academic performance and career development. The target population was primarily those currently working in the HES (higher education sector). In 2013, NIFU extended the survey to include a comparable sample of Norwegian researchers. In addition to higher education institutions, the extended version was sent to a representative sample of public research institutes.

Following the Frascati Manual,¹⁷ three fields of science are used: Physical Sciences and Engineering, Life Sciences, and Social Sciences and Humanities. We applied the sampling strategy developed by Bassiakos (2012) and utilised a two-stage stratified cluster sampling approach based on two stratification variables: current country and field of science. The clusters were defined as "Department X in Country Y and field of science Z".

The data set examines international mobility patterns among researchers in the higher education sector from the following 10 European countries: Belgium, France, Germany, Italy, the Netherlands, Poland, Spain, Sweden, Switzerland and the United Kingdom.¹⁸ In addition, NIFU has collected similar data for Norwegian researchers in the same sector.¹⁹ In total, we therefore have comparable data for researchers from 11 European countries. The entire sample of researchers used in the analysis consists of 6,489 persons.

In the analysis we also divide the entire sample of researchers into two subgroups: researchers from the Nordic countries (i.e. Norway and Sweden) and researchers from countries other than the Nordic countries (i.e. the nine countries other than Norway and Sweden).

We examine international mobility patterns among researchers from each country and from each subgroup of countries. Five mobility patterns are used:

- (v) International mobility experience at least once in the research career.
- (vi) International mobility experience of at least one move to a new employer in another country in the research career.
- (vii) International mobility experience of at least one research visit in another country in the research career (without changing employer).
- (viii) International mobility experience of being employed as a researcher in different sectors in the research career.
- (ix) International mobility experience in a Nordic country during the research career.

¹⁷ OECD version 2002, http://www.oecd-ilibrary.org/science-and-technology/frascati-manual-2002_9789264199040-en

¹⁸ Data from the SIM-ReC project are used in Marinelli (2012, 2013).

¹⁹ NIFU's mobility survey covers data for researchers in both the higher education sector and the institute sector in Norway. In the analysis we only use data for researchers in the higher education sector, since this sector is only covered in the data for researchers from the 10 other European countries.

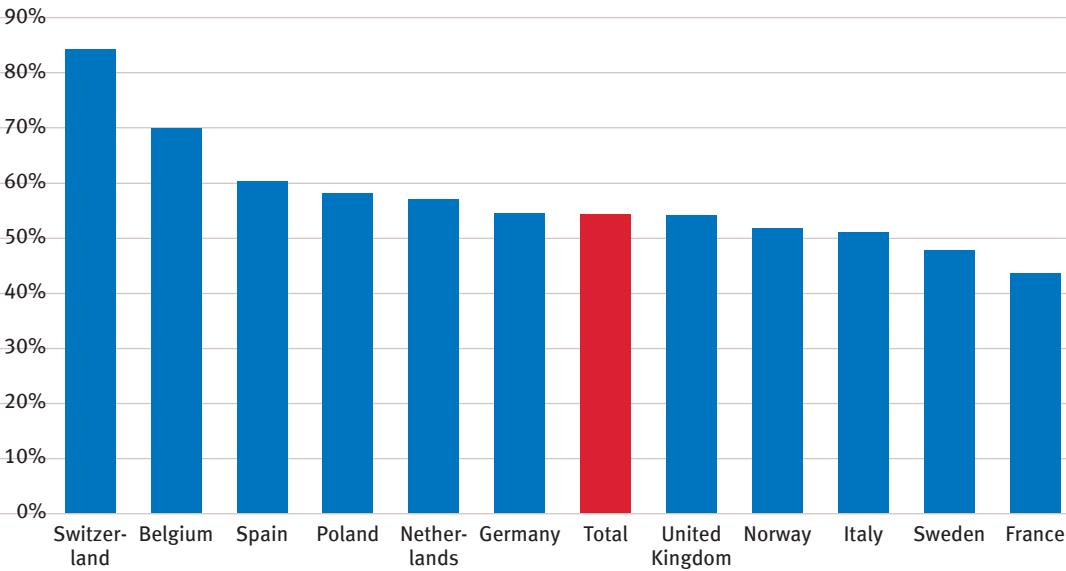
International mobility experience at least once in the research career

Figure 6 indicates that an estimated 54 per cent of HES researchers in the 11 European countries have been internationally mobile. This share is very close to what we found from Figure 2, where the corresponding figure was 56 per cent of the EU27 researcher population. The figure also indicates that the share of internationally mobile researchers is highest among researchers from Switzerland (84%) and Belgium (70%), and lowest among researchers from France (44%) and Sweden (48%). The estimated share is lower among researchers from Norway (52%) compared with the share for all 11 European countries as a whole.

As a consequence, the share of internationally mobile researchers is lower among the group of Nordic researchers (52%), i.e. researchers from Norway and Sweden compared with researchers from countries other than the Nordic countries (56%), i.e. researchers from countries other than Norway and Sweden. This is seen in Figure 7.

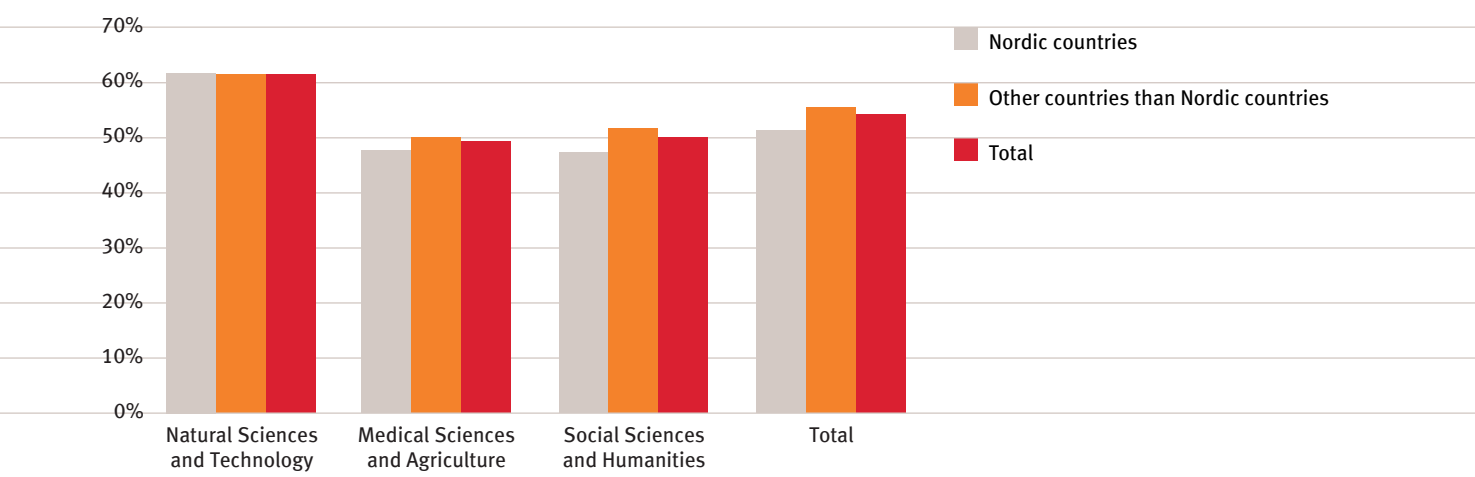
We also see from Figure 7 that natural sciences and technology have the highest share of internationally mobile researchers among researchers from Nordic countries and other countries (both 62%), while medical sciences and agriculture fields have the lowest share among countries other than the Nordic countries (50%). The corresponding share for medical sciences and agriculture fields and social sciences and humanities fields are the same for Nordic researchers (both 48%).

Figure 6: Estimated share of researchers in the higher education sector in 11 selected European countries with international mobility experience at least once in their research career. n=6,489.



Source: The SIM-ReC project and NIFU's mobility survey of Norwegian researchers.

Figure 7: Estimated share of researchers in the higher education sector in 11 selected European countries with international mobility experience at least once in their research career by field of science. n=6,489.



Source: The SIM-ReC project and NIFU's mobility survey of Norwegian researchers.

Key points:

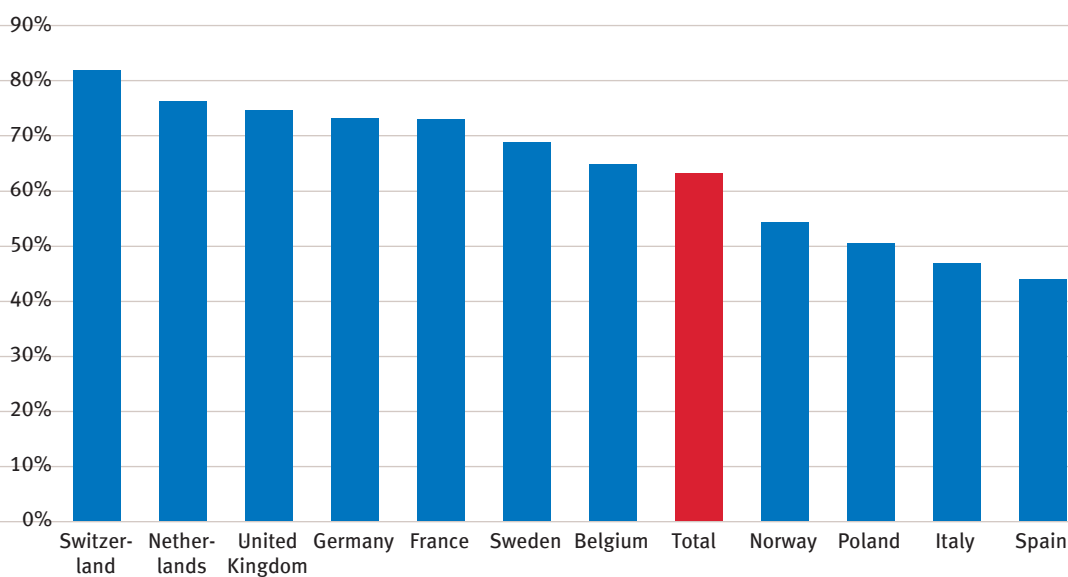
- Fifty-four per cent of the researchers from the higher education sector in the 11 European countries are estimated to have been internationally mobile researchers (similar observation in MORE I).
- Norway and Sweden are countries with relatively lower shares of international mobility.
- Natural sciences and technology fields have the highest share of internationally mobile researchers (similar observation in MORE I).

International mobility experience of at least one move to a new employer in another country

Figure 8 indicates that 66 per cent of the internationally mobile researchers have moved to at least one new employer in another country during their research career. This share is highest among researchers from Switzerland (85%) and the Netherlands (79%), and lowest among those from Spain (46%) and Italy (49%). The share is lower among Norwegian researchers than the national average, while the share is relatively higher among Swedish researchers.

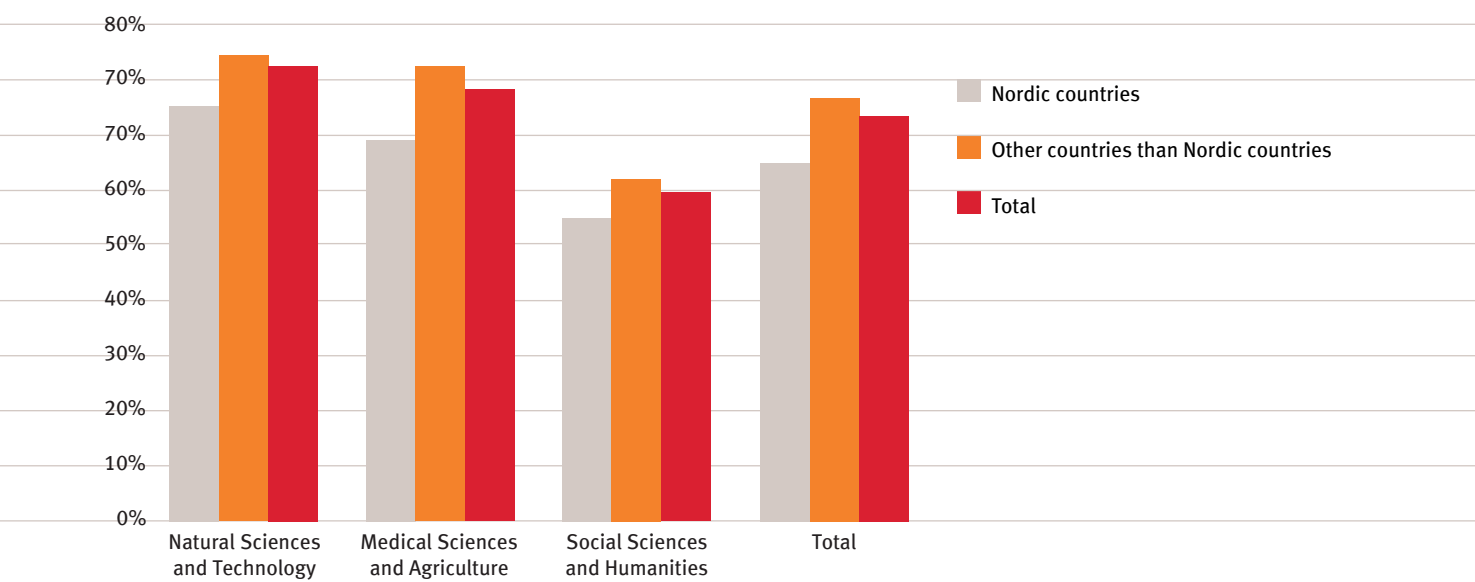
Figure 9 shows that Nordic researchers have a lower share of those who have experienced a change of job (58%) compared with non-Nordic researchers (69%). For both groups this share is highest for researchers in the natural sciences and technology, and lowest for those in the social sciences and humanities.

Figure 8: Proportion of internationally mobile HES researchers in the 11 European countries who have moved to a new employer in another country at least once during their careers. Estimated shares of mobile researchers. n=3,578.



Source: The SIM-ReC project and NIFU's mobility survey of Norwegian researchers.

Figure 9: Proportion of internationally mobile HES researchers in the 11 European countries who have moved to a new employer in another country at least once during their careers. Estimated shares of mobile researchers by field of science. n=3,578.



Source: The SIM-ReC project and NIFU's mobility survey of Norwegian researchers.

Key points:

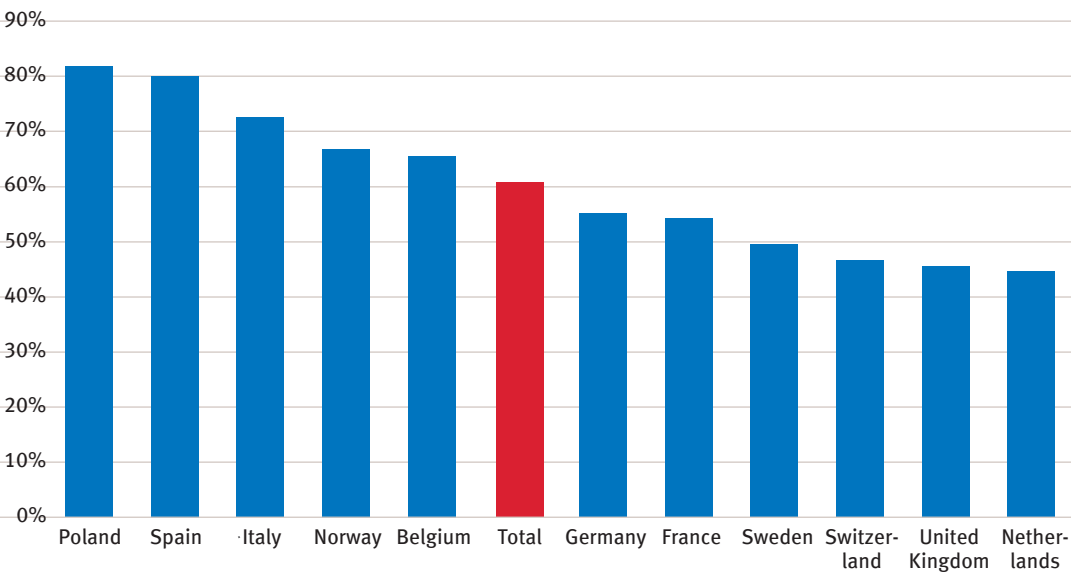
- 66 per cent of the internationally mobile researchers who have experienced at least one move to a new employer in another country in their research career;
- Nordic researchers have a lower share of those who have experienced a change of job compared with non-Nordic researchers (this point differs from the finding in MORE I);
- For both groups this share is highest for researchers in the natural sciences and technology.

International mobility experience of at least one research visit in another country in the research career

An estimated 61 per cent of the internationally mobile researchers have embarked on at least one research visit abroad during their research career, according to Figure 10. Poland (82%) and Spain (80%) have the highest shares, and the Netherlands (45%), the United Kingdom (46%) and Switzerland (47%) the lowest shares. The share for Norway is higher than the average share, while the share for Sweden is relatively lower.

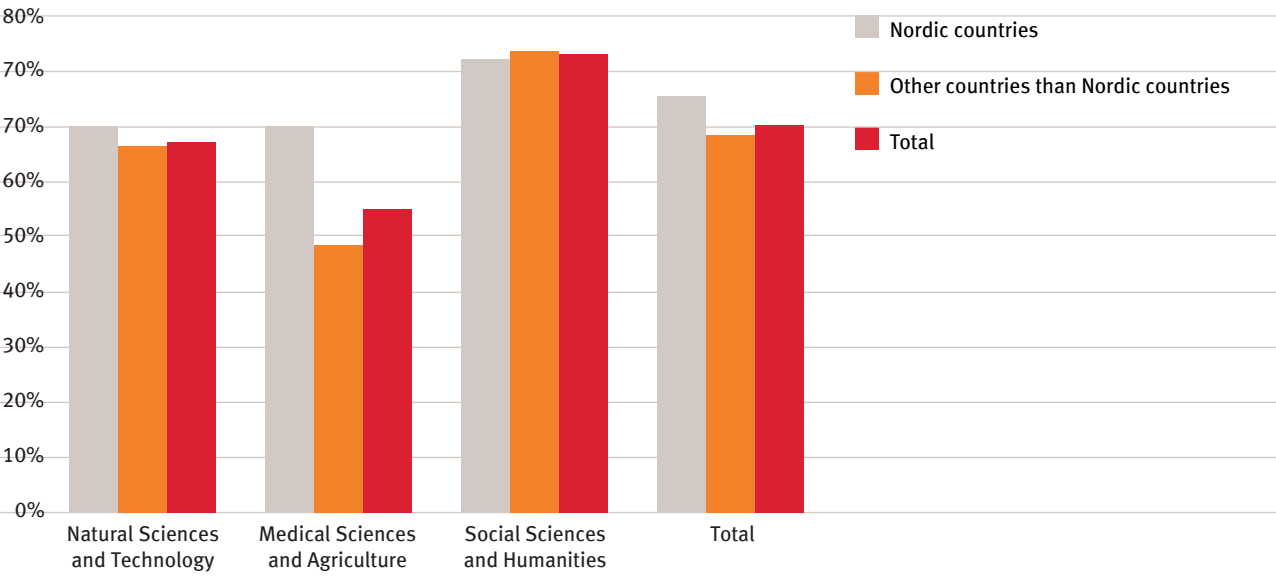
For the Nordic countries as a whole (65%) the share of researchers who have conducted a research visit abroad is higher than for non-Nordic countries as a whole (59%). This is seen in Figure 11. The highest share is found for researchers in the social sciences and humanities for both groups, and the lowest share for non-Nordic researchers in the medical sciences and agriculture. This share is the same for Nordic researchers in the natural sciences and technology and the medical sciences and agriculture.

Figure 10: Proportion of internationally mobile HES researchers in the 11 European countries who have conducted a research visit abroad (3 months or more) at least once during their careers. Estimated shares among all internationally mobile researchers. n=3,234.



Source: The SIM-ReC project and NIFU's mobility survey of Norwegian researchers.

Figure 11: Proportion of internationally mobile HES researchers in the 11 European countries who have conducted a research visit abroad (3 months or more) at least once during their careers, by field of science. Estimated shares among all internationally mobile researchers. n=3,234.



Source: The SIM-ReC project and NIFU's mobility survey of Norwegian researchers.

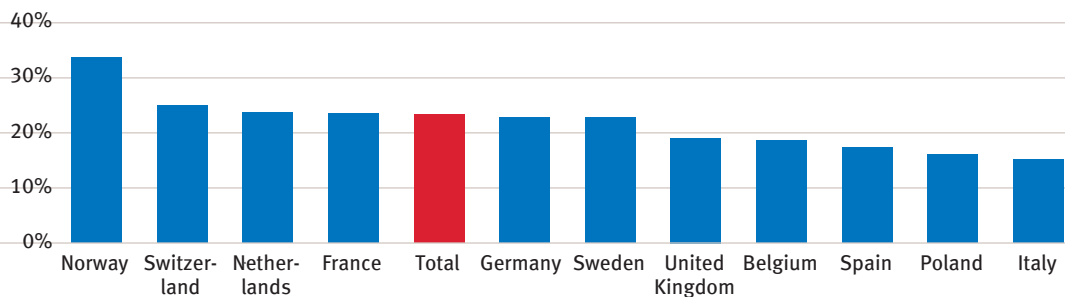
Key points:

- For the Nordic countries as a whole (65%) the share of researchers who have conducted a research visit abroad is higher than for non-Nordic countries as a whole (59%);
- The highest share is found for researchers in the social sciences and humanities for both groups.

International mobility experience of being employed as a researcher in different sectors in the research career

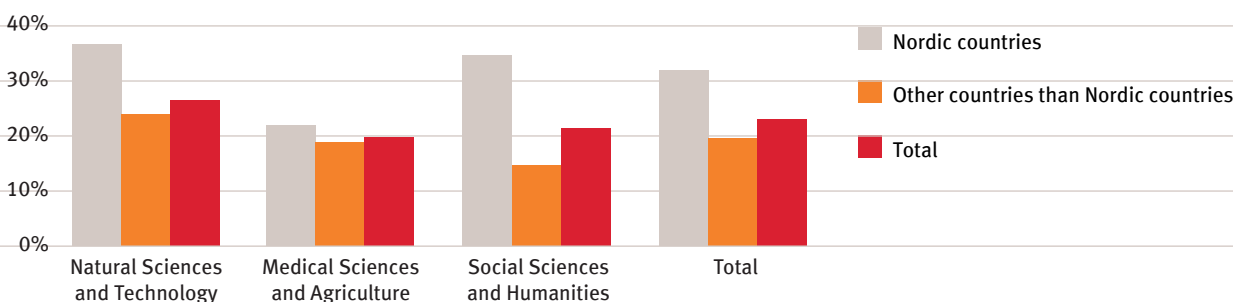
Norwegian researchers have the highest share of researchers in the higher education sector (34%) in the 11 selected European countries who have been employed as a researcher in different sectors in the course of their research career. This is shown in Figure 12. The lowest share is found among Italian researchers (15%). For Sweden this share is the same as for all researchers as a whole (23%). Figure 13 shows that the share is higher among Nordic researchers than non-Nordic researchers for each of the three fields of science.

Figure 12: Estimated share of researchers in the higher education sector in 11 selected European countries who have been employed in different sectors during their research career. n=6,312.



Source: The SIM-ReC project and NIFU's mobility survey of Norwegian researchers.

Figure 13: Estimated share of researchers in the higher education sector in 11 selected European countries who have been employed in different sectors during their research career, by field of science. n=6,312.



Source: The SIM-ReC project and NIFU's mobility survey of Norwegian researchers.

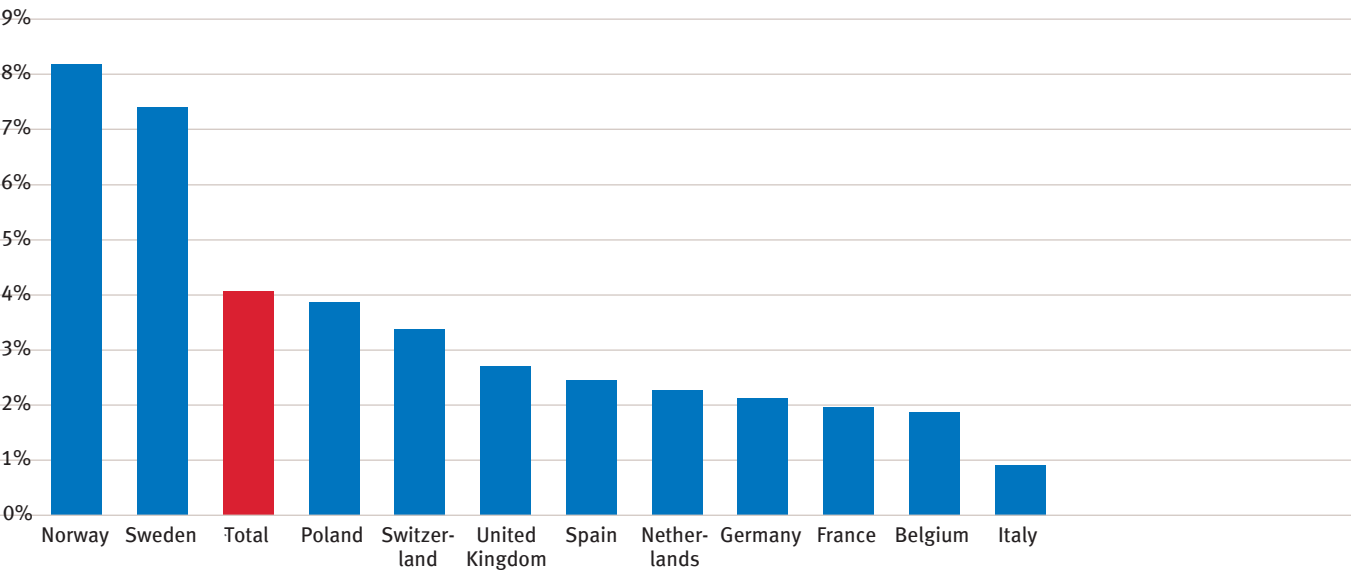
Key points:

- Norwegian researchers (34%) have the highest share of researchers in the HES who have been employed as a researcher in different sectors in their research career;
- For Sweden this share is the same as for all researchers as a whole (23%);
- The share is higher among Nordic researchers for each of the three fields of science.

International mobility experience involving the Nordic region

In Figure 14 we explore the proportion of researchers who have held at least one position in a Nordic country during their research career. For researchers from Norway and Sweden, the figure reflects positions in any of the other Nordic countries during their research career. This involves four per cent of all researchers in the sample. The presentation indicates that a greater proportion of researchers from Norway (8%) and Sweden (7%) have held positions in (other) Nordic countries compared with researchers from the other (non-Nordic) countries. The share is lowest for Italy (1%).

Figure 14: Estimated share of researchers in the higher education sector in 11 selected European countries who have held at least one position in a Nordic country during their research career. n=6,489.



Source: The SIM-ReC project and NIFU's mobility survey of Norwegian researchers.

Key point:

- Intra-Nordic mobility is higher amongst Norwegian and Swedish researchers compared with (non-Nordic) researcher mobility to a Nordic country.

5.3 Observations

In light of the policy interest demonstrated above, this chapter has synthesised existing information about researcher mobility among and between the Nordic countries. In a successor study to MORE 1 and SIM-ReC, we utilised these two surveys to help to lay a baseline for the extent and orientation of researcher mobility in this context. A number of salient features of mobility of HES researchers are noted here, despite slightly different results from the two studies. The results include the observation that more than half of the researchers in the sector claim to have engaged in some form of mobility during their careers, that the proportion is highest in the physical and natural sciences, that Nordic researchers tend in general to be slightly less mobile than European researchers, that Nordic researchers exhibit somewhat different patterns in terms of research visits, etc. We will return to these observations in the final chapter.

In addition to noting that the results are slightly different for the two studies, we pointed out above that surveys are prone to a number of important limitations that may affect their accuracy. In the next section, we embark on a new empirical analysis to supplement this view and to flesh out the findings more specifically for three of the Nordic countries: Norway, Sweden and Iceland.

6. CV analysis of Nordic researchers

In order to address the Horizon 2020 priorities on researcher mobility, better analytical tools and methods are needed. Ten years ago the European EU ENMOB - European Network on Human Mobility project - concluded that “Electronic CVs is a potentially very rich data source. The use of CVs is widespread. More and more CVs are on the Internet, on institutional/individual web pages and in large ‘jobmatching’ databases.” (Ekeland 2003: 4). This source of information about research careers has become the focus of recent work that combines CV data with bibliometric analysis (Sandström 2009; Reiner, C; S Meyer 2012; Aksnes et al., 2012).

This section uses CV data to complement the traditional survey approach above. As remarked, there are notable limitations to using surveys to trace researcher mobility and career development. These include non-response bias, the availability of information on work experience in the private sector, etc. In particular, an approach based on CVs can help us to gauge the extent and orientation of researcher mobility in the various national and sectorial contexts even more accurately than through surveys, which are sensitive to non-response. In addition, the approach can provide the basis for analysing the incidence of various types of mobility with different outcomes, including collaboration, publication, and patenting. The disadvantage of the approach is that it is labour intensive in terms of collecting as well as collating the data. Here we explore the CVs of researchers currently based in one of three Nordic countries: Norway, Sweden and Iceland.

6.1 Method and data

Triangulating from existing sources (surveys), this section seeks to update knowledge of mobility patterns and trends using CV analysis. Much progress has been made in semi-automated methods for analysing CV-based data. A current example is the European project SISOB (An Observatorium for Science in Society based in Social Models) which is developing a robust software-based approach to collating information in CVs. We have conducted our work on the Nordic Crossing report in conjunction with the ongoing SISOB activities (<http://sisob.lcc.uma.es>), including the beta-testing of their platform during the analysis of Nordic CVs.

We report on the outcome of the efforts to collect, compile, and analyse the 1,850 researcher CVs from three Nordic countries. We begin by discussing important aspects of the collection/compilation process before moving on to present the results of the analysis while also discussing some apparent implications.

Collection and compilation issues

First, a couple of observations are in order about the CV as an information source. Researchers are keen to promote their achievements within academia. The researcher’s CV tends to be up-to-date and include the most important components of the researcher’s career up to that point. However, the CV is not an official transcript. As in the case of a survey, it is the researcher himself/herself who fills out and submits the CV. And although there are outside factors that help to ensure the accuracy of the information, the extent and form in which it is presented depend on the context in which the researcher has compiled the version of the CV that is collected.

When utilising CVs for analysis of aggregate behaviour patterns (i.e. mobility), we should try to account for factors that may generate differences in the information collected. In our case, the CVs were collected

from two types of sources, roughly corresponding to Norway on the one hand and to Sweden and Iceland on the other. In the case of Norway, the CVs were culled from the Internet, especially from the CRISTin site where work experience is listed.²⁰ We note that some research institutions in Norway are better at encouraging researchers to post this information. The material comes from the largest universities and a number of research-performing organisations. (These research institutions will be called RPOs in our presentation.) In the case of Sweden and Iceland, the CVs were culled from successful applications for public funding.²¹

1. Norway: Sourced from CRISTin, linked only to work-experience.
2. Sweden: Sourced from funding agencies.
3. Iceland: Sourced from funding agencies.

In total, 1,900 CVs were collected from these two main types of sources.²² We note that while this is a large number of CVs to collect and collate, it is far from the total population of researchers in the three countries. The subpopulations are samples that do not necessarily provide a complete and representative picture of all researchers in the respective countries. The 1,900 CVs represent a substantial yet partial picture of the active researchers in each of the three countries. Our presentation of the work at this point leaves the question of representativeness in abeyance.

The ancillary question involves whether the CVs from the two sources are comparable. We acknowledge that the two main sources imply certain structural differences that should be accounted for when interpreting the results. The differences include (i) the researchers who are included/excluded (ii) the amount of information included in the CV and (iii) how well the information from the CVs was captured.

- a. Who the researcher is: Source 1 (funding agencies) implies that the researcher is involved in certain subfields that are relevant to the profile of the funding agencies. In addition, it implies that the researcher is of sufficient stature to be included in a successful application for funding. The profile of these CVs (950 processed CVs for Sweden, 360 for Iceland) may thus be different from the Norwegian CVs (Source 2) which represent a broader population that is weighted for some higher education institutions and RPOs.
- a. Form of the CV: Source 1 (funding agencies) implies that the researcher tailors his/her CV to the specific proposal. The information may therefore be less comprehensive than the short version of the CV a researcher may report to Source 2 (on his/her own accord or with the prodding of the organisation);
- a. How the CV was culled and collated: A final difference we note is that Source 2 data was accessed in uniform, well-structured XML format. In contrast, Source 1 data was accessed from PDFs based on different document structures.²³ The (Source 1) data was compiled by the SISOB before being washed and collated (in Stata) together with the Source 2 data. The fact that the Source 2 data were not processed in SISOB may also introduce differences, depending on how well that software process reproduced the CV-based information.

20 In this step, we used standard crawler software to collect the data in either PDF or XML format. This approach was cleared with the Norwegian Social Science Data Services (NSD) (in Norway) and included dialogue with the Ministry of Education and Research and with the administration of CRISTin. The identity of the CV holders was of course anonymised.

21 These public documents were provided with the decisive contribution of several funding agencies in Sweden and Iceland. The collection of data was subjected to several rounds of formal authorisation to ensure that privacy/confidentiality issues were upheld.

22 In addition, information solely about research visits/sabbatical was collected from another 3,800 Norwegian researchers.

23 We wish to acknowledge the extensive help we received from a number of people in accessing, compiling, and analysing the data (cf. the preface).

These are some areas of concerns that should be kept in mind when comparing the researcher data from the three countries. One broader implication is that certain information has only been partially reproduced during the compilation stage of the analysis. This means that there were more specific areas (variables) where comparisons could not be performed.

- a. The association between the date fields and the current and past position data was not fully reliable in all the material, and has therefore been dropped in this presentation.
- b. To account for researcher age and researcher seniority, we used (i) the earliest starting date for a position and (ii) the highest position attained within the sector, respectively.
- c. Researchers might include information about visiting positions in different ways. In many cases, the visiting position is registered as such: in this case, only substantial visiting positions are expected to be included. However, information about visiting positions is largely excluded in the Source 2 (Norwegian) data. By and large, it has been hived off in a separate dataset from the data about job experience.
- d. Field of science is assigned to three large categories based on keywords (humanities/social sciences, natural/physical sciences, health/medicine).

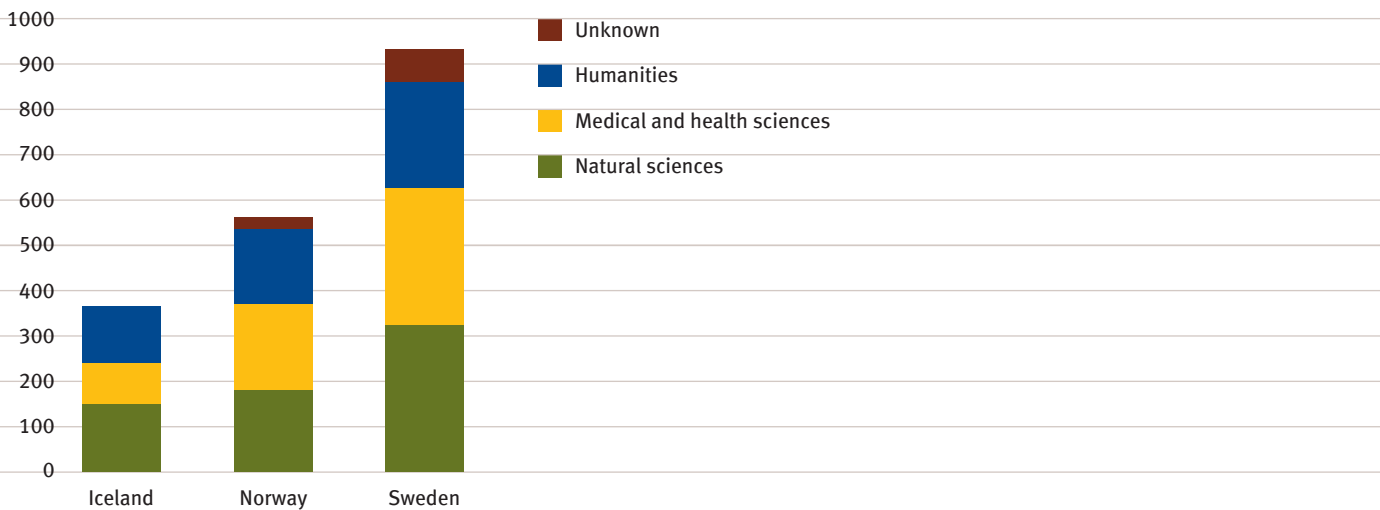
6.2 The overall population

We start by presenting the overall population of researchers. We particularly emphasise four dimensions about the total population in this preliminary step because they are expected to influence the propensity and direction of researcher mobility (see discussions above). These dimensions are: the national context, the field of science, the research career stage (and age), and the institutional context.

In total, more than 1,900 CVs were collected from three Nordic countries. Some were from researchers from other countries, others were incomplete, and a small proportion were not readable. The collection process yielded over 2,200 CVs. During the first stage of reviewing and registering the CVs, about 10 per cent of them were removed either because they involved foreign project partners, they were not in English, or the format was inaccessible. Excluding these, we arrived at an overall population of some 1,850 researchers: this population provides the lens through which we explore the propensity and direction of researcher mobility in this section.²⁴

The first figure (Figure 15) illustrates how the total population is distributed by country and field of science. It illustrates that half (923) of the total number of CVs (1,847) are from researchers currently working in Sweden, while 30 per cent are from Norway (559) and the remaining 20 per cent (365) are from Iceland. In relation to overall country size, Iceland is therefore overrepresented in the sample, while Norway is somewhat underrepresented.

Figure 15: Overview of the population by field of science and country. n=1,847.



Source: NIFU (compiled) see data notes.

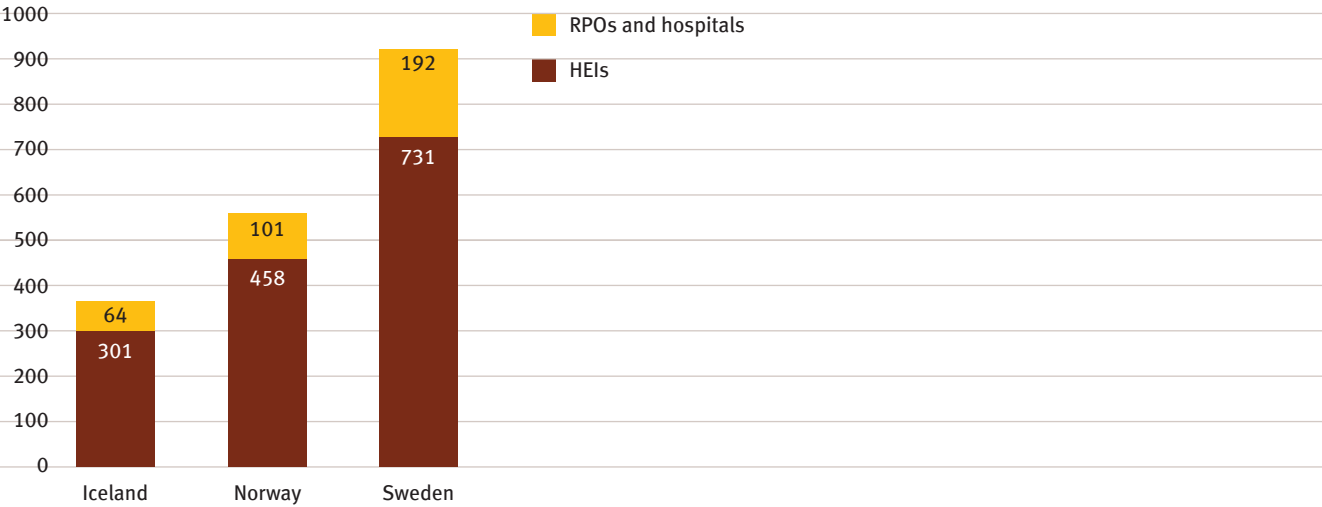
The figure further categorises researchers according to the same broad fields of science used above. We find a relatively even distribution across the three fields of science, with natural/physical sciences accounting for 36 per cent, health/medicine for 31 per cent, and humanities/social sciences for 28 per cent of the total.²⁵ This even distribution is helpful when we explore the importance of the researcher’s discipline in terms of the propensity and direction of researcher mobility.

²⁴ Descriptive statistics of the population are found in the annexes.

²⁵ Field of science could not be allocated based on information extracted from the remaining 5 per cent of CVs.

A further dimension to account for is the sectorial affiliation of researchers. Figure 16 distinguishes between researchers currently (or in their latest position) employed at either a university or college (HES) or at a research institute (RPOs) or hospital. We find that a majority of the researchers are in the HES while roughly 20 per cent are affiliated with a hospital or research institute.²⁶

Figure 16: Overview of the current (“home”) institutional affiliation by country: universities and colleges (HES), and research institutes (RPOs) and hospitals. n=1,847.



Source: NIFU (compiled) see data notes.

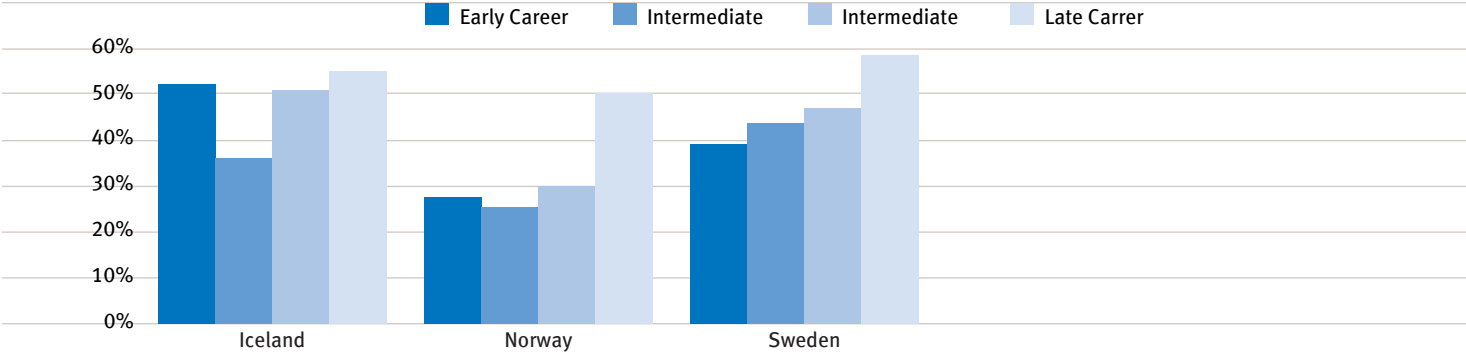
Another recognised determinant of researcher mobility is the seniority/career stage of the researcher. There are differences between the mobility of early stage and later stage researchers (see also chapters 3-4). We distinguish here between two components of seniority. The first component is length of the researcher’s active career, and the researcher’s age is implied by this measure (with implications for the family situation). The second component is the seniority of the researcher within academia. The combined effect of this seniority idea is assumed to affect researcher mobility.

²⁶ We note that in some cases it can be difficult to distinguish hospitals from universities and research institutes.

We differentiate between those researchers whose most senior position in the CV indicates an early career stage, which includes post-docs and research assistants, an early intermediate career stage, which includes lecturers, researchers and fellows, a late intermediate stage, which includes associate professors, senior researchers and readers, or a late career stage which primarily includes professors and advanced administrative positions. We differentiate the two components of the seniority classification in the next figure. Figure 17 presents the year of the earliest position that researchers on average had held at each career stage for each of the fields of science. It reveals some differences. For example, today's professors in the social sciences entered their first position in academia in 1994 (on average), while those in health and medicine are on average older, their careers having started three years earlier. There are country differences in this measure as well.

Figure 17 indicates the year, on average, when researchers embarked on their career (the earliest position found in the CV). This measure of an entrant position can be used to estimate the starting year of the researcher's career. On this assumption, the figure indicates that there are differences in the length of careers when broken down by different fields and at different career stages.

Figure 17: Average year of entrant positions by field of science and career stage.



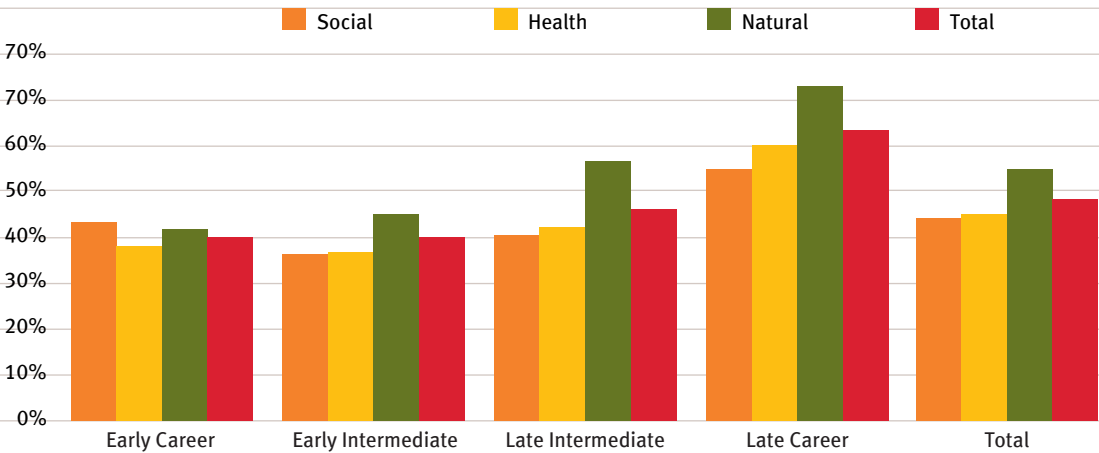
Source: NIFU (compiled) see data notes.

6.3 International mobility

Against this backdrop, the tri-country CVs are used to follow up the question of the extent and orientation of researcher mobility in the Nordic area. We start by looking at the extent of researcher mobility in the various fields of sciences. We will distinguish between two main types of researcher mobility. To build on the presentation of the composite survey material in chapter 5, we will first gauge the extent of geographic (or international) mobility among these Nordic researchers. In addition to taking stock of researchers who have held one or more positions abroad, we will also explore sector mobility, i.e. whether these researchers registered positions in a sector other than their “home” sector (see Figure 16 above). The sectors include HES, PROs, the government sector, and the private sector.

We start with geographic mobility. The survey above suggested that the proportion of internationally mobile researchers is in the range of 47-52 per cent for the Nordic researchers (in the HES). As assumed, the proportion of mobile researchers is indeed reduced when we consult a full range of researcher CVs on this issue.²⁷ The proportion is closer to 43 per cent for the Nordic countries when we concentrate on positions with specified foreign entities. However, there are substantial differences within the population. Figure 17 illustrates that these differences are specifically linked to the field of science and the career stage.

Figure 18: Geographic mobility: percentage by career stage and by field of science.



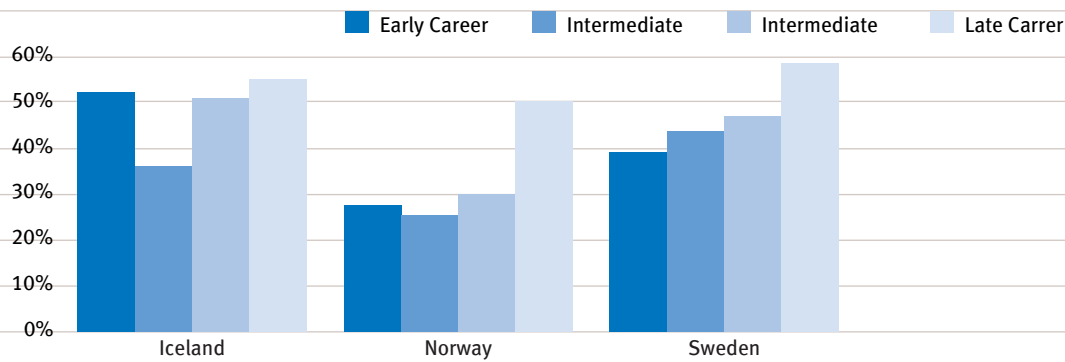
Source: NIFU (compiled) see data notes.

The figure confirms that the probability of having been geographically mobile in one’s career is closely linked to the researcher’s field and that it rises with the stage of the researcher’s career. This rise, however, does not appear to be monotonic: the step from associate professorships and other late-intermediate positions to full professorships and other late-career positions is very pronounced. Likewise, the probability for researchers in the natural and physical sciences appears to be qualitatively different from the other areas.

The trend is similar both for HES and RPOs. However, there are apparent differences at the country level. Figure 19 reveals that, in general, the propensity is lower in Norway than in the other countries, especially for earlier stages of the career, while it is more in line at the highest level of seniority. The fact that there are apparent differences at earlier career stages for the different countries might be due to one or more factors. The fact that the CVs for Sweden and Iceland come from successful funding careers while those from Norway represent a more general population suggests one possible explanation. Another factor related to the discussion above is that the distinction with visiting positions is clearer in the Norwegian data (see footnote 26, above).

²⁷ We should note here, though, that the delimitation between geographic mobility and visiting position is even less clear-cut when analysing the material. In the case of Norway, visiting positions are organised in a different way (see also below). In the other countries, there are indications of other visiting position, although it is not clear how consistently various researchers have labelled positions as “visiting”. We assume there is considerable overlap.

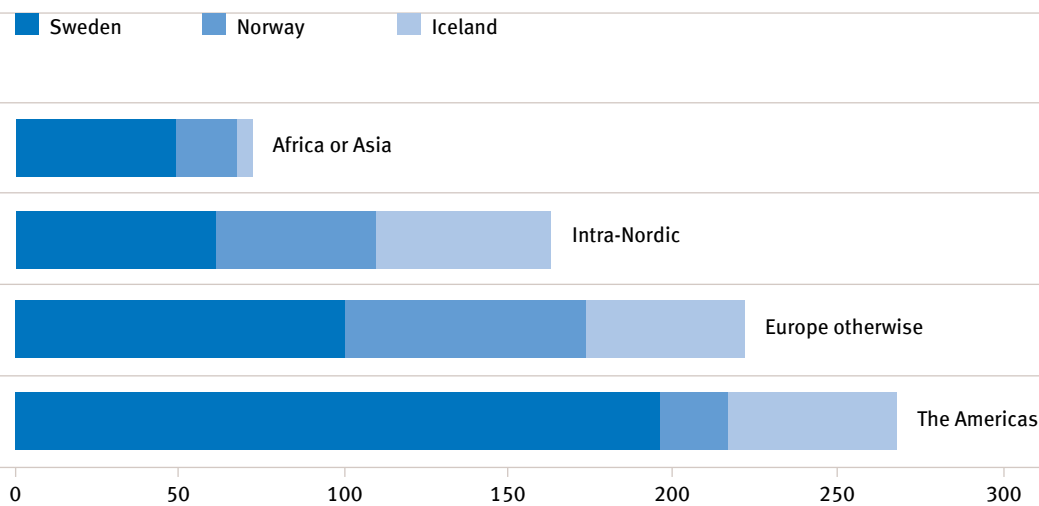
Figure 19: Geographic mobility: percentage by career stage and by current country.



Source: NIFU (compiled) see data notes.

Figure 19 also indicates that international mobility is more common at all career stages. This corresponds with the observation that, given its size and its position, Iceland relies to a higher degree on mobility than the larger countries. In the case of the larger number of Swedish researchers, there is a high correlation between seniority and the cumulative probability of international mobility. A corollary question is whether there are identifiable patterns in the regions where researchers have held foreign positions.

Figure 20: Geographic mobility by country of origin and external affiliations.



Source: NIFU (compiled) see data notes. Note. Intra-Nordic refers to positions in Nordic countries other than the “home affiliation”. The geographical destinations could not be decided for 16 researchers.

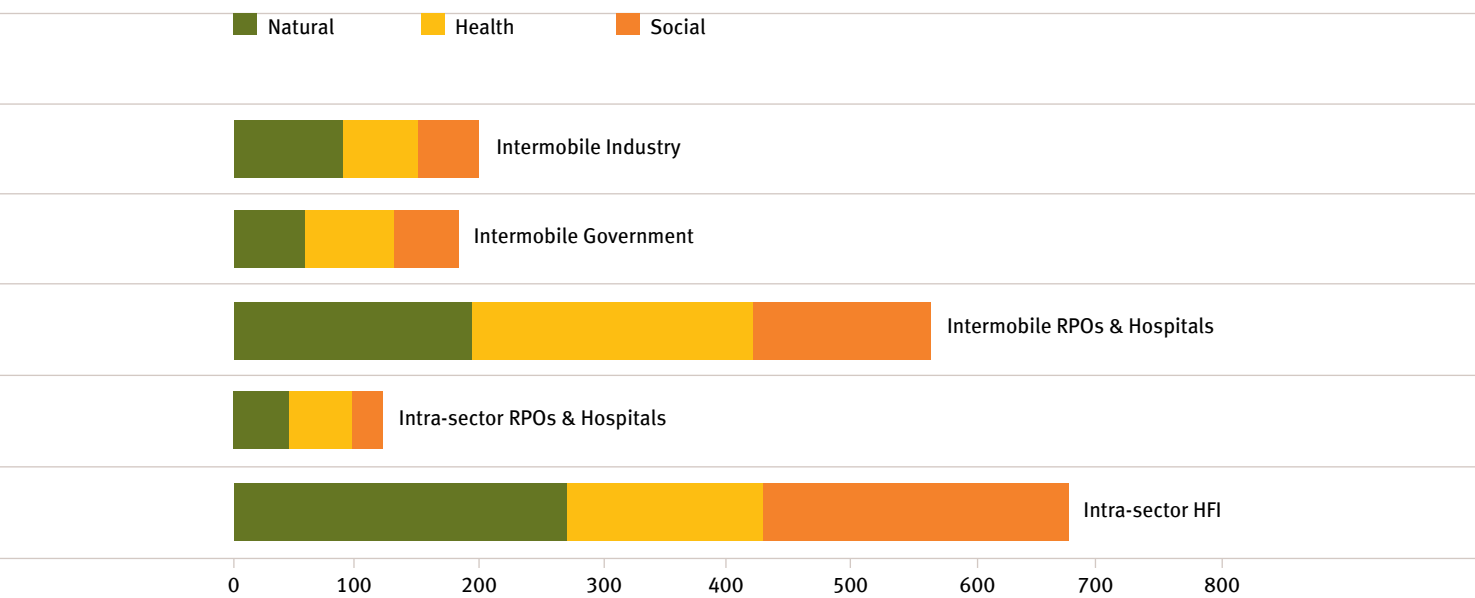
Figure 20 confirms the assumption that the US (included here with Canada and South America) is a popular host for Nordic researchers. The Americas dominate as a destination particularly among Swedes (and particularly in the natural and physical sciences), while Icelandic researchers are more evenly distributed across the Americas, other Nordic countries, and other European countries. The picture is somewhat different for Norway (where visiting positions are not as clearly a part of geographic mobility). Norwegian researchers are more likely to remain in Europe.

6.4 Sector mobility

One advantage of CVs over surveys when studying researcher mobility is that CVs more reliably capture sector mobility. In short, researchers are more likely to report this form of activity in the CV than in a survey. Here, we differentiate between positions reported in the private sector, positions reported in the “public” sector (including a range of entities from schools to NGOs) as well as those in the HES and RPO sectors.

We distinguish between affiliations within the same sector (“intra-sector”) from those that involve one of the other sectors (“inter-sector”) mobility. Sector mobility involves the latter, especially in those cases that involve interaction with the public or private sectors. Interaction with these external sectors is assumed to be related to the field of science. Figure 21 breaks down the changes in affiliation within and between sectors by field of science that are reflected in the CVs.

Figure 21: Intra-sector vs. inter-sector mobility by field of science. n=1,748.



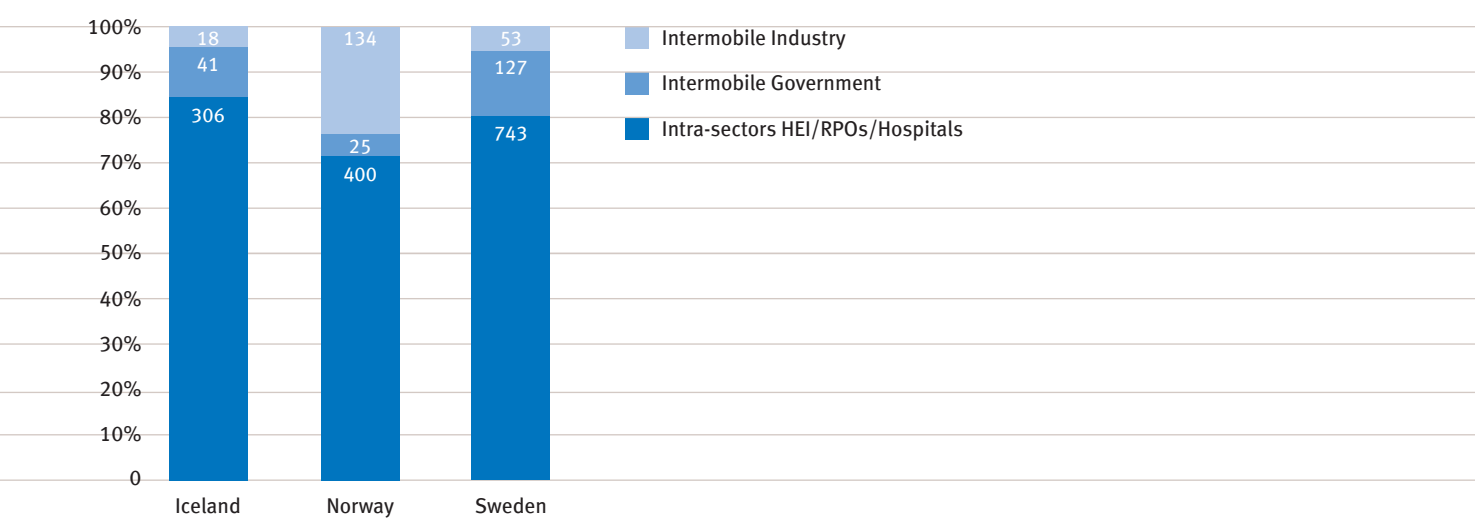
Source: NIFU (compiled) see data notes.

Changes in affiliation within the same sector (HES or RPOs) – as well as between these home sectors for researchers – is shown in the lower three categories. The snapshot it provides of interaction within and between HES or RPOs is useful as a backdrop against which to gauge the degree to which the different fields of science interact with the public and private sectors. Assuming the HES and RPO sectors are distinct in the three countries,²⁸ we find extensive contact between them. This is especially the case for researchers in the hard sciences and in medicine and health, again due in part to the ambiguous position hospitals hold in the taxonomy. The figure tells us that in addition to the extensive interaction between the HES and RPO sectors (including hospitals), the figure indicates that more than one in five researchers (383 or 22%) in the HES and RPO sectors had been affiliated in some way with at least one private or public body thus far in their careers.

²⁸ As indicated above, the relationship between the sectors differ from country to country. For example, there is a larger RPO sector in Norway than in Sweden (see the policy discussion), and the relationship between hospitals and universities is different in different jurisdictions. In some cases, it makes little sense to differentiate too much between hospital positions and positions at universities or other research institutes.

The relationship between the sectors differs between the countries. The sector mobility patterns for Sweden and Iceland are most similar. There we find that about 50 per cent of the researchers have moved around within their home sectors (the green and red areas), while another 30 per cent have moved between the HES and RPO sectors. In Figure 22, all affiliations within the HES and RPO/hospital sectors are pooled. In this way, we can better highlight the affiliations with the public and private sectors.

Figure 22: Intra-sector versus inter-sector mobility by country. n=1847.



Source: NIFU (compiled) see data notes.

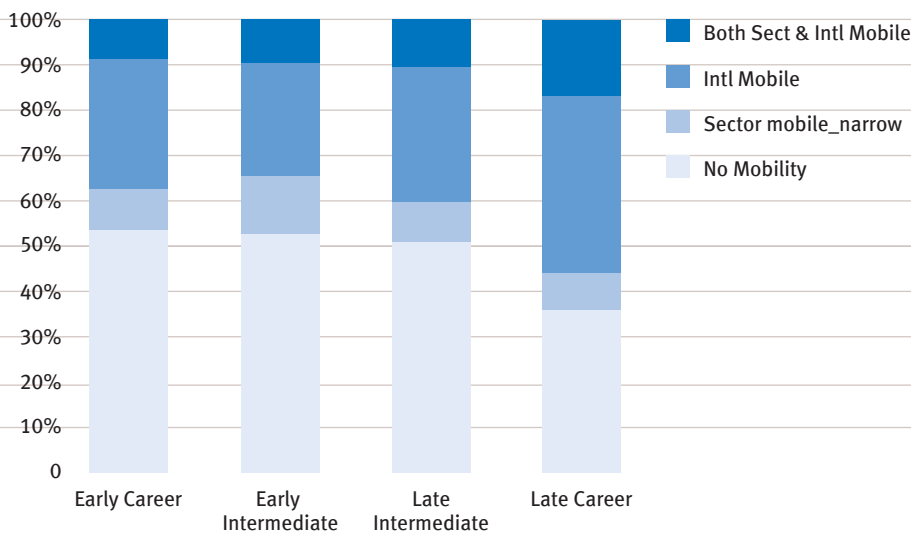
Assuming that researchers only list positions in their CVs that are relevant for their careers (this is a strong assumption), then the appearance of a position in the private sector (e.g. a consultancy, general medical practitioner, a financial institution, a publisher) represents an extension of the researcher’s career development. The same is true for the public sector, which includes a range of positions in education (high school teachers, pedagogic experts, etc.), as well as in NGOs and other trans-national institutions (World Bank, UN, OECD) and ministries (even at the very highest levels). Figure 22 points out some apparent differences between Norway, in particular, and Sweden and Iceland. We find that Norwegian researchers account for a disproportionate share of the link with the private sector and correspondingly lower levels of intra-sector mobility. The cause of this difference is not known and would require further exploration.

6.5 Overall researcher mobility

To conclude our exploration into what CVs can tell us about mobility patterns, we combine the various forms of researcher mobility in a cross-country and cross-disciplinary context. In addition to taking stock of international mobility and sector mobility, it is useful to account for the overlap between the two. This can help determine the degree to which the same researchers are both geographically and sectorally mobile.

In this concluding section, we restrict sector mobility to include only affiliations that HES and/or RPO researchers have had with the public and private sectors. Figure 23 emphasises the observation that the overall proportion of researchers who have not been mobile in either sense declines as the research career develops (follow the light blue column from left to right). Over half of the researchers who are currently at an early career stage (e.g. post-doc) do not seem to engage in either form of mobility; the proportion of non-mobile researchers declines to a third for late career positions.²⁹

Figure 23: Sector and international mobility by career stage. n=1,768.



Source: NIFU (compiled) see data notes.

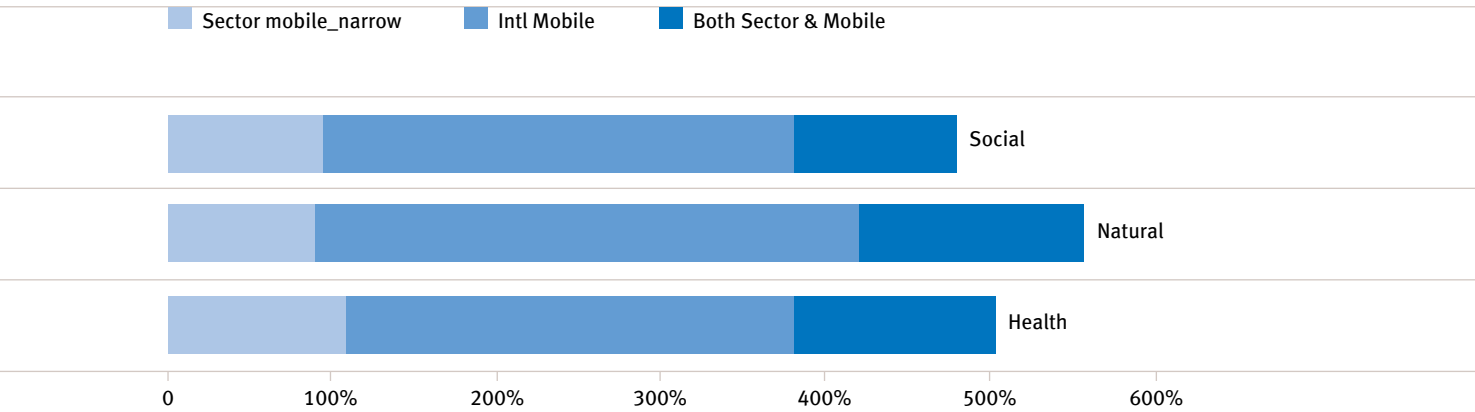
On this basis, the figure allows us to compare the proportion that has been sectorally mobile (red, i.e. positions in the private or public sector), the proportion that has been internationally mobile (green), and the proportion that has been both sectorally and internationally mobile for each career stage: early, early intermediate, late intermediate, and late career stages. Using CVs as a lens, we see that the proportion of researchers with affiliations in other sectors but not in other countries amounts to 10 per cent on average. The proportion is relatively stable throughout the career stages (6-8 per cent), with the notable exception of researchers currently at an early intermediate stage where the proportion is higher. The reason for this is not immediately apparent.

The probability of an international affiliation grows more clearly with seniority, as does the probability for a combination of sector and international mobility. It is again the step from late intermediate to the most senior positions where we find the most striking effect.

²⁹ As indicated above, this measure of career stage does not reflect how long the researcher has worked in the sector. It only reflects the highest level of seniority achieved in the positions extracted from the CV. Seniority and career ladders are different in different environments, especially between HES and RPOs/hospitals.

Finally, we explore whether researchers in the various fields of science display distinct profiles of mobility behaviour. Figure 24 focuses on the proportion of researchers in each field of science that are mobile in one of the three ways: sector mobility, international mobility or a combination. The social sciences and humanities are slightly less mobile than the average, while the natural and physical sciences are more so. Researchers in the health/medicine field tend to be more oriented towards sector mobility and are less likely only to list a foreign affiliation on their CVs.

Figure 24: Sector and international mobility by field of science: proportion of total population. n=903*.



Source: NIFU (compiled) see data notes.*Another 38 mobile researchers could not be classified by field of science.

7. Conclusions

Improving the conditions for researcher mobility is (re)emerging as a central priority of European research and innovation policy. This priority is prominent in the Europe 2020 strategy and in current policy initiatives under the European Research Area. These forward-looking objectives build on an extensive tradition in Europe for the study of researcher mobility patterns, the factors that shape them and the effects they have. This tradition can be traced back at least to the Human Capital and Mobility programme (1992), and it extends forward to recent large-scale surveys.

The Nordic countries have been active contributors to this tradition. As small economies at the periphery of Europe, they have been keen to promote the benefits of researcher mobility, both within the region and with other countries. In addition to size and geography, a set of other factors unite the Nordic countries around this common focus. Whether or not there is a true “Nordic model”, there are certain commonalities in terms of academic traditions, cultural dimensions, labour market organisation, political organisation, and international ties including a longstanding passport union. However, there are also important country differences that affect mobility in various ways.

In this light, this report has taken stock of the current status of researcher mobility with and between the Nordic countries. The report first provided a digest of issues related to researcher mobility and it surveyed the way that researcher mobility is being approached in the Nordic countries. The report then collected empirical results. It went on to provide a brief résumé of what existing surveys (MORE I and SIM-ReC) have said about the propensity for researcher mobility within and between the Nordic countries as compared to other European countries. Moreover, the report presented new work on the patterns of mobility in different contexts (country, institutional, career stage, and field of science) based on an extensive exploration of researcher CVs.

In sum, the Nordic Crossing project — in conjunction with the parallel work of Technopolis (Sweden) — has provided an updated, unique empirical understanding of the current status of researcher mobility within and between the Nordic countries. This should be useful in light of the Europe 2020 strategy and the policy initiatives that are emerging under the European Research Area. The success of forward-looking initiatives in the Nordic region and in Europe more generally will continue to depend on reliable, up-to-date empirical work on changing researcher mobility patterns.

In conclusion, we sum up some of the empirical work from the previous chapters.

7.1 Some lessons about researcher mobility in the Nordic countries from existing surveys

The following observations are drawn from the empirical studies (MORE) presented in chapter 5, section 5.1. MORE I includes Sweden, Denmark, and Finland and the other EU countries.

MORE I and international mobility

International mobility during the research career:

- Over half (56%) of the EU27 researchers in the HES have been internationally mobile during their careers;
- The level of mobility varies between scientific fields. Natural sciences and technology fields have the highest share;
- The share of internationally mobile researchers is lower among Nordic researchers (47%) than among non-Nordic researchers;
- But there is no difference among the EU27 with regards to field of science.

International mobility involving a move to a new employer in another country:

- The share of researchers who have experienced a change of job is somewhat higher among Nordic researchers (57%) than among non-Nordic researchers (50%);
- This share is considerably higher if we look at changes by field of science. This share is much higher among Nordic researchers (76%) than among non-Nordic researchers (47%) in the medical sciences and agriculture.

International mobility involving a research visit to another country without a change of employer:

- Seventy-eight per cent of the internationally mobile researchers have conducted at least one research visit in another country in their research career;
- Nordic researchers have a higher share of researchers who have conducted research visits in the social sciences and humanities compared with non-Nordic researchers.

International mobility the last three years:

- Twenty-nine per cent of the EU27 researcher population in the higher education sector has been internationally mobile the last three years. This share is somewhat lower for Nordic researchers (27%) than for non-Nordic researchers (29%);
- For Nordic researchers this share is highest in the social sciences and humanities and lowest in the natural sciences and technology.

SIM-ReC and international mobility

The following observations are drawn from the empirical studies (SIM-ReC) presented in chapter 5, section 5.2. SIM-ReC includes Norway, Sweden, and nine other European countries.

International mobility experience at least once in the research career

- Fifty-four per cent of the researchers from the higher education sector in the 11 European countries are estimated to have been internationally mobile researchers (similar observation in MORE I).
- Norway and Sweden are countries with a relatively lower share of international mobility.
- Natural sciences and technology fields have the highest share of internationally mobile researchers (similar observation in MORE I).

International mobility experience of at least one move to a new employer in another country in the research career

- Sixty-six per cent of the internationally mobile researchers have experienced at least one move to a new employer in another country in their research career.
- Nordic researchers have a lower share of those who have experienced a change of job compared with non-Nordic researchers (this point contradicts the finding in MORE I).
- For both groups this share is highest for researchers in the natural sciences and technology.

International mobility experience of at least one research visit in another country in the research career

- For the Nordic countries as a whole the share of researchers who have conducted research visits is higher (65%) than for non-Nordic countries as a whole (59%).
- The highest share for both groups is found for researchers in the social sciences and humanities.

International mobility experience of being employed as a researcher in different sectors in the research career

- Norwegian researchers have the highest share of researchers in the HES (34%) who have been employed as a researcher in different sectors in their research career.
- For Sweden this share is the same as for all researchers as a whole (23%).
- The share is higher among Nordic researchers for each of the three fields of science.

International mobility experience in a Nordic country during the research career

- Intra-Nordic mobility is higher amongst Norwegian and Swedish researchers compared with (non-Nordic) researcher mobility to a Nordic country.

7.2 Some lessons about researcher mobility in the Nordic countries from CV analysis

The CV provides another lens into the researcher mobility question. The presentation points out some of the implicit advantages of this lens and how analysis based on CVs can be used to triangulate with the results from surveys and other information collection exercises. At the same time, some of the practical difficulties were presented in this exploratory exercise. There are important differences between the CVs collected for Sweden, Norway, and Iceland. These should be kept in mind when considering the results.

International researcher mobility

- In a composite measure, 43 per cent of researchers in the three countries list a foreign affiliation on their CVs. This composite measure straddles a conservative estimate (from the Norwegian CVs³⁰) and a higher estimate (from Swedish and Icelandic CVs³¹).
- There is a strong correlation between international mobility and seniority (or career stage).³² In all country contexts, CVs of researchers who have reached the highest levels of seniority are much more likely to hold/have had foreign affiliations than those at an early stage.
- The CV analysis supports survey findings that international mobility varies by field of science. The propensity for international mobility is highest in the natural and physical sciences.
- The profile of foreign affiliations differs for researchers in the various countries. The Americas dominate as a destination particularly among Swedes. Icelandic researchers are more evenly distributed across America, other Nordic countries, and other European countries, while Norwegian researchers are more likely to remain in the Nordic region or in Europe more widely.

Sector researcher mobility

- There is considerable change in affiliations within and between the HES and RPO sectors.
- More than one in five researchers (383 or 22%) in the HES and RPO sectors had been affiliated in some way with at least one private or public body so far in their careers.
- There are apparent differences between countries. Norwegian researchers account for a disproportionate share of the link with the private sector.
- Links with the private sector are more predominant in the field of natural and physical sciences than the other fields.

Overall researcher mobility

- The overall proportion of researchers who have not been mobile in either sense declines as the research career develops.
- There is a significant overlap between international and sector mobility. In particular, sector mobility tends to correlate with international mobility.
- The proportion of researchers with affiliations in other sectors but not in other countries amounts to 10 per cent on average. The proportion is relatively stable throughout the career stages.
- The probability of an international affiliation grows more clearly with seniority, as does the probability for a combination of sector and international mobility. It is the step from late intermediate to the most senior positions where we find the most striking effect.
- The social sciences and humanities are slightly less mobile than the average, while the natural and physical sciences are more so. Researchers in the health/medicine field tend to be more oriented towards sector mobility and are less likely only to list a foreign affiliation on their CVs.

³⁰ Note: The measure for Norway excludes “visiting positions” (which are systematised in another file). The same is not necessarily the case for the Swedish and Icelandic CVs.

³¹ CVs for Sweden and Iceland come from successful funding careers while those from Norway represent a more general population.

³² Note that the relationship between the duration of career (“average year for entrant position”) and seniority varies by field. See Figure 16.

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Annexes

Annex 1: Mobility programmes in the Nordic countries

This is a non-comprehensive list of programmes in the Nordic countries that fund research mobility across sectors or internationally. It was compiled largely by Technopolis with input from NIFU for Nord-Forsk. Note that many of the programmes listed are not exclusively designed to promote research mobility. Note also that funding for research mobility can also be included in ordinary research projects, which for example is the case for projects funded by the Research Council of Norway. Programmes primarily funded by the European Union as part of e.g. Marie Curie Actions, Joint Programming Initiatives and the ERA-Net scheme are not included either.

Table 1: Mobility programmes in the Nordic countries (Technopolis, with input from NIFU)

Country	Name of programme	Budget	Funding agency	Time frame	Target groups and aim
Denmark	Sapere Aude programme	DKK 245 mill. awarded in 2012	Danish Council for Independent Research	2010-	The programme is designed as a talent development programme for the elite. There are no requirements as to applicants' citizenship, the location of research institutions or the specific venue for carrying out the research activities applied for. However, in all cases, a general assessment criterion is the extent to which the project applied for will benefit Danish research.
Denmark	EliteForsk-rejse-stipendier	DKK 6 mill. (yearly)	Ministry for Science, Innovation and Higher Education	2006-	The Elite Research travel grant scheme has been initiated as a framework for action that aims to find, strengthen and nurture some of the brightest and most talented researchers. The research prize is awarded to outstanding young researchers (under the age of 45) of international excellence.
Denmark	SPIR	DKK 64 mill. (total budget)	Danish Council for Strategic Research (DCSR)	2013-	SPIR funds initiatives which seek to strengthen the link between strategic research and innovation, thereby promoting efficient knowledge dissemination and possibilities for fast application of new knowledge in connection with innovation in the private and public sectors.

Country	Name of programme	Budget	Funding agency	Time frame	Target groups and aim
Denmark	BONUS	DKK 30 mill. (total budget)	Danish Council for Strategic Research (DCSR)	2012-	This programme aims to strengthen cooperation regarding research and innovation between countries in the Baltic sea region, within defined themes on the Baltic Sea and the Baltic Sea drainage basin and coastal zone. Its primary focus is on marine and coastline research, including societal challenges in the region which are connected with environmental protection, sustainable development, business, food security and sea carriage.
Denmark	Innovation Consortia	DKK 230 mill. awarded in 2012	Danish Council for Technology and Innovation (DCTI)	2012-	Innovation consortia are collaboration projects between companies, research institutions and advisory/knowledge dissemination parties. Collaboration should be agreed on for a period of two and four years. Calls were issued in 2009, 2010 and 2012. The consortia may involve mobility of staff.
Denmark	Industrial PhD	DKK 10 mill. (for 2013)	Danish Council for Technology and Innovation (DCTI)	2002-	An Industrial PhD project is a three-year industrially focused PhD project where the student is hired by a company and enrolled at a university at the same time. The company receives a monthly wage subsidy of DKK 14,500 while the university's expenses for supervision, etc. are covered. The PhD student works full-time on the project and divides his or her time equally between the company and the university.
Denmark	Innovation Assistant	N/A	Danish Council for Technology and Innovation (DCTI)	N/A	The Innovation Assistant Programme provides funding for small and medium-sized companies (two and 100 employees) to hire an academic employee with an education at the master's degree level or higher. The employee must be employed to solve specific task(s).

Country	Name of programme	Budget	Funding agency	Time frame	Target groups and aim
Denmark	Innovation Network Denmark	N/A	Danish Council for Technology and Innovation (DCTI)	N/A	Innovation Network Denmark has 22 nationwide innovation networks and three strategic platforms. An innovation network is a forum where companies and knowledge institutions share experience and develop new ideas within a specialist or technologically delimited field. Each network has pools for innovation projects where companies and researchers work together to solve concrete challenges. The innovation networks also carry out idea generation processes and matchmaking activities, and they hold theme meetings and specialist events. The innovation networks are open to all interested parties.
Denmark	MOBILEX	N/A	Danish Council for Independent Research	N/A	The objective of the MOBILEX Programme is to support the mobility and scientific development of researchers in the beginning of their research careers. The MOBILEX Programme is open to researchers within all fields covered by the Danish Council for Independent Research. A MOBILEX Mobility Grants apply to research projects of a duration of 24 months that will be carried out at research institutions within or outside Denmark. To be eligible for a grant, the applicant must have obtained a PhD degree and must not have stayed for more than a total of 12 months in the country of the proposed host research institution within the last three years before the application deadline.
Denmark	Industrial post-doctoral research fellowships	N/A	Danish National Advanced technology Foundation (DNATF)	2011-	The Danish National Advanced Technology Foundation supports projects and platforms that involve industry-science cooperative research. Since 2011 DNATF has funded 20-25 industrial post-doctoral research fellowships per year.
Finland	FiDiPro (Finland Distinguished Professor Programme)	N/A	Academy of Finland and Tekes	2007-	The programme seeks to recruit scientists from abroad, offering fixed-term research and teaching posts to top foreign scientists or Finnish scientists who have worked abroad for a long time at the professorial level.

Country	Name of programme	Budget	Funding agency	Time frame	Target groups and aim
Finland	Academy research fellow	N/A	Academy of Finland	N/A	Applicants for a research posts as an academy research fellow apply for funding for their own salary for a maximum of five years. The aim of the funding is to provide an opportunity for the most talented, advanced researchers to develop their academic leadership skills and to establish themselves as independent researchers. Funding gives a monthly salary of EUR 4,842.
Finland	Post-doctoral research fellow	N/A	Academy of Finland	N/A	The aim of the funding for a post as a post-doctoral researcher is to advance the professional competence and independence of the most promising young researchers who have recently earned their doctorate. Post-doctoral researchers are encouraged to engage in international mobility and collaboration as well as national, cross-sectoral mobility. The three-year funding period may include one or several mobility stays as well as funding for the researcher's return to Finland. In principle, a project awarded funding must promote Finnish research and society or international collaboration. Funding covers salary for 36 months, personal research costs, and international and national mobility.
Finland	Academy professors	N/A	Academy of Finland	N/A	Applicants for a research post as an Academy professor apply for funding for their own salary for a maximum of five years. The aim of the funding is to facilitate full-time scientific research for internationally leading-edge researchers. The applicant is a researcher. Research posts as Academy professor are intended for leading-edge researchers for full-time research and related tasks. Academy professors pursue their own research plans, supervise their team and provide guidance to junior researchers. Funding gives a monthly salary of EUR 8,713 and allocated funding for indirect employee and overhead costs.

Country	Name of programme	Budget	Funding agency	Time frame	Target groups and aim
Finland	Serve	EUR 224 mill. (total budget)	Tekes	2006-2013	The Serve – Pioneers of Service Business Programme encourages Finnish companies to become global leaders in the customer-centric, knowledge-based service business. Serve aims to create new knowledge about service innovation and encourages the development of innovative, internationally competitive service concepts in companies by challenging traditional ways of doing things at both the strategic and operational levels.
Finland	SHOKs	EUR 40-60 mill. (annually for each centre)	Tekes, Academy of Finland	2006-	The Strategic Centres for Science, Technology and Innovation established in Finland are new public-private partnerships for speeding up innovation processes. Their main goal is to thoroughly renew industry clusters and to create radical innovations.
Norway	International Scholarship scheme	N/A	Research Council of Norway	N/A	The scheme encompasses 11 sub-programmes and bilateral mobility agreements for studies and research in Norway, and funds researcher mobility and networking between institutions from Norway and other countries. The scheme encompasses all subject areas. Target groups are incoming and outgoing researchers/students. The scheme includes several region-based programmes. Budgets vary according to type of scholarship, from NOK 200 000 to NOK 10 mill.
Norway	YGGDRASIL mobility grants for research visits in Norway	NOK 10 mill. (yearly)	Research Council of Norway	2009-	Highly qualified, international PhD students and younger researchers in connection with research visits in Norway.
Norway	Bilateral mobility programme - North America (Leiv Eiriksson)	NOK 6 mill. (yearly)	Research Council of Norway	2004-2014	Incoming and outgoing mobility/ PhD candidates and researchers within all scientific fields. In the period 2005-2009 the programme gave support to 202 researchers.
Norway	Bilateral mobility programme with France (the Aurora Programme)	NOK 0.6 mill. (yearly)	Research Council of Norway	1999-	The RCN supports outgoing mobility. The programme supports short visits for researchers and researcher groups within all fields. Support is given to about 15 projects yearly.

Country	Name of programme	Budget	Funding agency	Time frame	Target groups and aim
Norway	Bilateral mobility programme Germany (DAADppp Programme)	NOK 0.8 mill. (yearly)	Research Council of Norway	2001-	The RCN supports outgoing mobility. The programme supports short visits for researchers and researcher groups within all fields.
Norway	JSPS scholarships for guest researchers and post-doctoral researchers to Japan	N/A	Research Council of Norway	2006-	The RCN supports outgoing mobility for senior researchers within SSH, natural sciences and technology. Support is provided to up to two researchers per year.
Norway	Norwegian Government scholarships to Chinese nationals	N/A	Research Council of Norway	2003-	The RCN supports outgoing and incoming mobility for senior researchers within SSH, natural sciences and technology. Support is provided to up to 10 researchers per year.
Norway	Fulbright Programme	N/A	The US- Norway Fulbright Foundation for Educational Exchange	1949-	The programme supports ingoing and outgoing master and PhD students, researchers, short term teaching visits.
Norway	International Scholarship Scheme	N/A	Research Council of Norway	N/A	The scheme encompasses 11 sub-programmes and bilateral mobility agreements for studies and research in Norway, and funds researcher mobility and networking between institutions from Norway and other countries. The scheme encompasses all subject areas. Target groups are incoming and outgoing researchers/students. The scheme includes several region-based programmes. Budgets vary according to type of scholarship, from NOK 200 000 to NOK 10 mill.
Sweden	Strategic Mobility	SEK 15 mill. for 2012-2013	Strategic Research Foundation	2012-2013	Varje bidrag inom programmet täcker en forskares eller motsvarande persons lön under en fyra till tolv månaders utbytestjänstgöring inom annan sektor än den som personen för närvarande är aktiv inom.
Sweden	International post-doctoral research fellowships	SEK 237 mill. awarded in 2012	Swedish Research Council	2012-	Syftet med bidraget är att främja internationell rörlighet för nydisputerade forskare med svensk doktorsexamen. Den unga forskaren ska få möjlighet att forska vid ett utländskt universitet eller forskningsinstitut samt även vid ett svenskt universitet, högskola eller forskningsinstitut.

Country	Name of programme	Budget	Funding agency	Time frame	Target groups and aim
Sweden	Post-doctoral scholarships	N/A	Wenner-Gren Foundation	N/A	Stipendierna är avsedda att möjliggöra för svensk disputerad forskare att verka vid utländsk vetenskaplig institution. Svensk medborgare, eller utländsk medborgare med permanent uppehållstillstånd i Sverige. Doktorsexamen skall vara avlagd i Sverige och senare än fem år före ansökningstillfället.
Sweden	Sabbatical scholarships	N/A	Wenner-Gren Foundation	N/A	Stipendierna är avsedda att möjliggöra för svensk senior forskare, vanligen professor, att verka vid utländsk vetenskaplig institution. Svensk medborgare, eller utländsk medborgare med permanent uppehållstillstånd i Sverige. Sökanden skall ha avlagt doktorsexamen tidigare än fem år före ansökningstillfället.
Sweden	Special post-doctoral scholarships – “Wenner-Gren Fellows”	N/A	Wenner-Gren Foundation	N/A	Stipendierna skall ge unga forskare inom området biomedicin möjlighet att erhålla kvalificerad postdoktoral utbildning utomlands samt att därefter bedriva forskningsverksamhet i Sverige. Med området biomedicin avses i detta sammanhang biologi, medicin, biokemi, biofysik och bioteknik. Avsikten är att utannonsera 5 stipendier varje år.
Sweden	FAS Outgoing International Post-doctoral Fellowship	SEK 19.5 mill. awarded in 2011	Forte (formerly called FAS)	2009-2015	Ger forskare inom FAS ansvarsområden möjlighet att tillbringa tid vid en utländsk institution för att utveckla sin kompetens och bygga gränsöverskridande forskningssamarbeten.
Sweden	Teaching sabbatical	N/A	STINT	2013-	STINTs program Teaching Sabbatical syftar till att utveckla såväl individer som institutioner. Genom att ge svenska universitets och högskolelärare internationella erfarenheter med utgångspunkt i lärarrollen, snarare än i forskarrollen, vill Stiftelsen bidra till att utbildningen förnyas och nya nätverk skapas.
Sweden	Mobility for Growth	EUR 35 mill. (total budget)	VINNOVA	2012-2017	Public/private mobility and international mobility.

Annex 2: Notes to figures in chapter 5

Figure 1: Notes: 1) The figure is based on the following question in the mobility questionnaire for the higher education sector (Question 55 in Annex 2 in MORE 2010): “In your research career (which also encompasses the whole period of your PhD-education) have you worked in another country than the country where you attained your highest educational degree, including research visits of 3 months or more? (NOTE: For this project, if you answer yes to this question you are considered as an ‘internationally mobile’ researcher.)” 2) The figure is only based on persons up to and including 70 years old in order to exclude retired researchers from the sample. 3) The shares of EU27 researchers in the figure are calculated by using the proportion method described in chapter 2 in MORE (2010), where we use the weights for all respondents. 4) The group of other EU27 countries consists of EU27 countries other than Denmark, Finland and Sweden.

Figure 2: Notes: 1) The figure is based on the following question in the mobility questionnaire for the higher education sector (Question 57 in Annex 2 in MORE 2010): “Did any of these instances of international mobility involve a move to a new employer in another country?” 2) The figure is only based on persons up to and including 70 years old in order to exclude retired researchers from the sample. 3) The shares of EU27 researchers in the figure are calculated by using the proportion method described in chapter 2 in MORE (2010), where we use the weights for mobile researchers. 4) The group of other EU27 countries consists of EU27 countries other than Denmark, Finland and Sweden.

Figure 3: Notes: 1) The figure is based on the following question in the mobility questionnaire for the higher education sector (Question 57 in Annex 2 in MORE 2010): “Did any of these instances of international mobility involve a research visit to another country without a change of employer?” 2) The figure is only based on persons up to and including 70 years old in order to exclude retired researchers from the sample. 3) The shares of EU27 researchers in the figure are calculated by using the proportion method described in chapter 2 in MORE (2010), where we use the weights for mobile researchers. 4) The group of other EU27 countries consists of EU27 countries other than Denmark, Finland and Sweden.

Figure 4: Notes: 1) The figure is based on the following question in the mobility questionnaire for the higher education sector (Question 58 in Annex 2 in MORE 2010): “Have you been internationally mobile the last three years?” 2) The figure is only based on persons up to and including 70 years old in order to exclude retired researchers from the sample. 3) The shares of EU27 researchers in the figure are calculated by using the proportion method described in chapter 2 in MORE (2010), where we use the weights for all respondents. 4) The group of other EU27 countries consists of EU27 countries other than Denmark, Finland and Sweden.

Figure 5: Note: 1) Weighted results of the respondents among researchers in 11 selected European countries. 2) A researcher is considered to have had an “international mobility experience at least once in their research career” if he/she has held at least one position abroad in a country different from where the highest educational level was completed, or if he/she has had any research visits abroad of at least three months since January 2000 (research visits abroad do not involve a change of employer).

Figure 6: Note: 1) Weighted results of the respondents among researchers in 11 selected European countries. 2) The group of Nordic countries consists of Norway and Sweden, and the group of countries other than the Nordic countries consists of Belgium, France, Germany, Italy, the Netherlands, Poland, Spain, Switzerland and the United Kingdom. 3) A researcher is considered to have had an “international mobility experience at least once in their research career” if he/she has held at least one position abroad in a country different from where the highest educational level was completed, or if he/she has had any research visits abroad of at least three months since January 2000 (research visits abroad do not involve a change of employer).

Figure 7: Note: 1) Weighted results of the respondents among researchers in 11 selected European countries. 2) A researcher is considered to have “experienced at least one move to a new employer in another country in their research career” if he/she has held at least one position abroad in a country different from where the highest educational level was completed, and if at least one of these positions has been at an institution other than his/her current position.

Figure 8: Note: 1) Weighted results of the respondents among researchers in 11 selected European countries. 2) The group of Nordic countries consists of Norway and Sweden, and the group of countries other than the Nordic countries consists of Belgium, France, Germany, Italy, the Netherlands, Poland, Spain, Switzerland and the United Kingdom. 3) A researcher is considered to have “experienced at least one move to a new employer in another country in their research career” if he/she has held at least one position abroad in a country different from where the highest educational level is completed, and if at least one of these positions has been at an institution other than his/her current position.

Figure 9: Note: 1) Weighted results of the respondents among researchers in 11 selected European countries. 2) A researcher is considered to have “conducted at least one research visit in another country in their research career” if he/she has had any research visits abroad of at least three months since January 2000 (research visits abroad do not involve a change of employer).

Figure 10: Note: 1) Weighted results of the respondents among researchers in 11 selected European countries. 2) The group of Nordic countries consists of Norway and Sweden, and the group of countries other than the Nordic countries consists of Belgium, France, Germany, Italy, the Netherlands, Poland, Spain, Switzerland and the United Kingdom. 3) A researcher is considered to have “conducted at least one research visit in another country in their research career” if he/she has had any research visits abroad of at least three months since January 2000 (research visits abroad do not involve a change of employer).

Figure 11: Note: 1) Weighted results of the respondents among researchers in 11 selected European countries. 2) A researcher is considered to have “been employed as a researcher in different sectors in their research career” if he/she has held at least one position in a sector different from his/her current position.

Figure 12: Note: 1) Weighted results of the respondents among researchers in 11 selected European countries. 2) The group of Nordic countries consists of Norway and Sweden, and the group of other countries than Nordic countries consists of Belgium, France, Germany, Italy, the Netherlands, Poland, Spain, Switzerland and the United Kingdom. 3) A researcher is considered to have “been employed as a researcher in different sectors in their research career” if he/she has held at least one position in a sector different from his/her current position.

Figure 13: Note: 1) Weighted results of the respondents among researchers in 11 selected European countries. 2) A researcher is considered to have “been employed as a researcher with different job descriptions in their research career” if he/she has held at least one position with a specified job description different from his/her current position.

Figure 14: Note: 1) Weighted results of the respondents among researchers in 11 selected European countries. 2) The group of Nordic countries consists of Norway and Sweden, and the group of countries other than the Nordic countries consists of Belgium, France, Germany, Italy, the Netherlands, Poland, Spain, Switzerland and the United Kingdom. 3) A researcher is considered to have “been employed as a researcher with different job descriptions in their research career” if he/she has held at least one position with a specified job description different from his/her current position.

Figure 15: Note: 1) Weighted results of the respondents among researchers in 11 selected European countries. 2) For researchers from Norway and Sweden, the figure shows the estimated shares of researchers who have had at least one position in another Nordic country during their research career.

Annex 3: Descriptive statistics for the CVs used in the analysis

Variable	Obs	Unique	Mean	Min	Max	Label
ID	1847	1847	853057,9	123	1400878	ID
DVmobility	1847	5	1,98863	0	4	Mobility by type
COUNTRY	1847	3	.	.	.	Country
SOURCE_AGG	1847	2	0,693557	0	1	Collection Source
SOURCE	1847	9	.	.	.	Source
CAREER_STAGE	1768	4	2,582014	1	4	
early	1557	5	3,110469	1	5	
EARLIEST_P~N	1564	49	1995,372	1915	2013	Start Date Year
NUMBER_Years	1505	20	4,106312	1	22	Years linked to new positions: number
BirthdayYear	129	39	1965,628	1943	2007	Birthday Year
VISIT_BINARY	1847	2	0,112074	0	1	Visiting Position
SECT_BINARY	1847	2	0,53059	0	1	Sector Mobility
MOB_SECT	1847	5	2,458581	1	5	InterSector Mobility
GEO_BINARY	1847	2	0,394694	0	1	Geographical Mobility
MOB_GEO	1847	4	2,345679	1	4	International Mobility
SEKTORER	1847	4	3,498105	1	4	
FIELDOFSCI~E	1748	3	.	.	.	SUBJECT
DUAL_AFFIL	1349	2	0,011119	0	1	
INSTITUTIO~R	498	69	.	.	.	EIERKODE
INSTTYPEKODE	498	9	.	.	.	INSTTYPEKODE
INSTITUTIO~E	1840	222	.	.	.	INSTITUTION_NAME
RANK0	163	1	.	.	.	CANDIDATES AND STUDENTS
RANK1	712	3	.	.	.	JUNIOR RESEARCH POSITION
RANK2	1145	2	.	.	.	ASSISTANT PROFESSOR & RESEARCH FELLOWS
RANK3	619	1	.	.	.	ASSOCIATE PROFESSOR & READERS
RANK4	534	3	.	.	.	PROFESSOR
RANK5	207	2	.	.	.	VISITING POSITION
RANK6	130	2	.	.	.	SEMI-ACADEMIC STAFF
RANK7	845	2	.	.	.	SENIOR RESEARCH ADMIN ROLES
RANK8	7	1	.	.	.	EDITING AND TEMPORARY FUNCTIONS
RANK9	105	1	.	.	.	POSITION IN NON-ACADEMIC SECTOR
_freqAFRICA	39	2	1,051282	1	2	AFRICA_freq
_freqAMERI~S	361	2	1,047091	1	2	AMERICAS_freq
freqASIA~C	104	3	1,076923	1	4	ASIA_PACIFIC_freq
_freqDENMARK	50	1	1	1	1	DENMARK_freq
_freqEUROPE	261	3	1,172414	1	3	EUROPE_freq
_freqFINLAND	25	1	1	1	1	FINLAND_freq
_freqICELAND	261	1	1	1	1	ICELAND_freq

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